

**CONTRACT DOCUMENTS
and
TECHNICAL SPECIFICATIONS**

for

**STORMWATER PUMP STATION
NO. 1 – MOTOR REPLACEMENT**

March 2016



City of
Norfolk

Department of Public Works

**7th Floor, City Hall Building
Norfolk, Virginia 23510
(757) 664-4631**

CITY OF NORFOLK

STORMWATER PUMP STATION NO. 1 MOTOR REPLACEMENT

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Posted: March 11, 2016

**INVITATION FOR BIDS
CITY OF NORFOLK - DEPARTMENT OF PUBLIC WORKS**

PROJECT: STORMWATER PUMP STATION NO. 1 MOTOR REPLACEMENT

Owner: City of Norfolk Department of Public Works Room 700, 7th floor, City Hall Building 810 Union Street, Norfolk, VA 23510 Contact: Rey Hernandez, P.E., Project Manager Tel: (757) 823-4020 / Fax: (757) 441-2402	A&E: Timmons Group 2901 S. Lynnhaven Rd., Suite 200 Virginia Beach, VA 23452 Contact: Ken Turner, P.E. Tel: (757) 213-6671
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Sealed bids are to be received in City of Norfolk Public Works Department, Attn: Contracts Office, Room 700, 7th floor, City Hall Building, 810 Union Street, Norfolk, VA 23510 until **2:00 p.m., Tuesday, April 5, 2016**, for the above titled Project. **A Pre-Bid Conference will be held at 9:00 a.m., Wednesday, March 23, 2016 at the site, Stormwater Pump Station No. 1, 199 Boush Street, Norfolk. Attendance is non-mandatory but highly encourages.**

The Work under this project consists of replacing the three existing 125 HP electric motors with new premium efficiency motors and reduced voltage autotransformer (RVAT) starters. The existing soft starters shall be removed from service and new wire and conduit shall be installed under the existing floor to power the new RVAT's. Bypass pumping and traffic control will be necessary. A new motor shaft shall also be provided for each new motor to ensure proper alignment and tolerances with the existing pump shaft at the coupling.

Bidding Documents are available from the Department of Public Works, provided on a CD, upon non-refundable payment of **\$5.00 per set** in the form of a check made payable to Treasurer, City of Norfolk.

A copy of the Bidding Documents will be on file and open to inspection at The Builders and Contractors Exchange, Inc., Norfolk, VA (757-858-0680) and the City of Norfolk web site www.norfolk.gov/bids.aspx.

A Bid Bond, certified check, or cashier's check made payable to the Treasurer, City of Norfolk, for 5% of total bid must accompany each bid. State Contractor registration class and number is required on the outside of the envelope. State Contractor registration class and number is required on the outside of the envelope. The City reserves the right to cancel the bid opening or to reject any or all bids in whole or part, when it is in the best interest of the City. The right to waive informalities and to determine responsiveness of any bid and responsibility of all bidders is reserved to the City. Withdrawal of bids will be in accordance with Section 33.1-42.1 of the Norfolk City Code and Section 11-54 of The Code of Virginia, 1950 (as amended).

David L. Ricks, P.E.
Director

The Virginian Pilot – March 13, 2016
DemandStar – March 13, 2016

INSTRUCTIONS TO BIDDERS

1. AUTHORIZATION TO TRANSACT BUSINESS IN THE COMMONWEALTH

- (a) Bidder or offeror organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 to include in its bid or proposal the identification number issued to it by the State Corporation Commission.
- (b) Any bidder or offeror that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law shall include in its bid or proposal a statement describing why the bidder or offeror is not required to be so authorized.

2. SUBMISSION OF BIDS

- (a) Make all bids on "Bid Form" and seal in opaque envelope. The name of project, the contractor's name, address, and Virginia Contractor Registration Class and Number shall be placed on the outside of the envelope.
- (b) If a contract is for \$120,000.00 or more, or if the total value of all such construction, removal, repair, or improvements undertaken by the bidder within any 12 month period is for \$750,000.00 or more, the bidder is required under Title 54, Chapter 11, Code of Virginia, 1950 (as amended), to show evidence of being licensed as a Class A Contractor. If a contract is \$7,500.00 or more, but less than \$120,000.00, or if the total value of all such construction, removal, repair or improvements undertaken by the bidder within any 12 month period is less than \$150,000, the bidder is required to show evidence of being licensed as a Class B Contractor. If a contract is \$1,000 or more, but less than \$7,500, or if the total value of all such construction, removal, repair or improvements undertaken by the bidder within any 12 month period is less than \$150,000, the bidder is required to show evidence of being licensed as a Class C Contractor. The bidder shall place on the bid above its signature its Virginia Contractor Registration Class and Number. If a contract is less than \$1,000.00, licensure is not required under Title 54, Chapter 11, Code of Virginia, 1950 (as amended).
- (c) If bids are submitted by mail, enclose the above noted envelope in a second sealed, opaque envelope and address to: **City of Norfolk, Department of Public Works, Attn: Contracts Office, Room 700, 7th floor, City Hall Building, 810 Union St., Norfolk, VA 23510.** Bids submitted by mail must be received at the above address before the time designated for bid opening.
- (d) Fully fill in all blanks in ink or typewritten, and state numbers in both writing and figures. Signatures shall be in longhand with name and title printed below. Bidders shall acknowledge all addenda in spaces provided on the bid form. For unit price contracts, in the event of a discrepancy between the Total Base Bid and the total of the extension of unit prices, the total extension of unit prices governs in determining the bid amount. For unit price contracts, in the event of a discrepancy between the extension of unit prices and the unit prices, the unit prices governs in determining the bid amount.
- (e) Interlineations, alterations, and irregularities of any kind may be cause for rejection of the bid. Erasures or any physical changes on the form shall be initialed by the Bidder.
- (f) Bidders may withdraw a bid after it has been submitted to the City any time prior to the stipulated time for opening such bids. Withdrawal of bids will be in accordance with Section 33.1-42.1 of the Norfolk City Code and Section 2.2-4330 of the Code of Virginia, 1950 (as amended).

3. EXAMINATION OF SITE

The bidder shall be responsible for having ascertained all pertinent local and existing conditions determinable by inspection and inquiry both on the site and adjacent thereto, including any other work being performed thereon, and shall include in its bid all cost attendant upon problems arising from said conditions existing at the time of submission of its bid.

Reference is made to the Contract Documents for information relating to reports, explorations, underground facilities, and easements. On request, the owner will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. The Bidder must fill all holes, clean up, and restore the site to its former condition upon completion of such explorations, investigations, tests and studies, and hold the Owner harmless from any damage to property or injury to persons resulting from or arising out of such explorations, investigations, tests, and studies.

4. INQUIRIES, INTERPRETATION AND ADDENDA

Should a bidder find discrepancies in, or omissions from, the drawings or documents, or should it be in doubt as to their meaning, it should at once notify the Owner in writing. The Owner will welcome such inquiries and they will be given consideration. Every interpretation made by the Owner will be in the form of a printed addendum which will be on file in the office of the Owner. Addenda will be posted to the Owner's web site, www.norfolk.gov/bids.aspx, it will be the bidder's responsibility to know of, examine and become familiar with all addenda issued. All addenda shall become a part of the Contract Documents. The Owner will not be responsible for any oral instruction.

The submission of a Bid will constitute incontrovertible representation by the Bidder that the Bidder has complied with every requirement of this Section, that without exception, the Bid is premised upon the agreement by the Bidder to perform the Work required by the Contract Documents, and applying specific means, methods, techniques, sequence or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that the Bidder has given Written Notice to the Owner of all conflicts, errors, ambiguities, and discrepancies that the Bidder has discovered in the Contract Documents and the written resolutions thereof by the Owner is acceptable to the Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions of performance and furnishing the Work.

THE LAST DAY TO SUBMIT RFI'S IS MONDAY, MARCH 28, 2016. A RESPONSE CANNOT BE GUARANTEED SHOULD AN RFI BE RECEIVED AFTER THIS DATE.

5. BID GUARANTEE

Bids shall be accompanied by a bid guarantee of five percent (5%) of the amount of the total bid including all additive alternates, if any, and may be a certified check or cashier's check or a Bid Bond, made payable to: **Treasurer, City of Norfolk**. Such bid bond or check shall be submitted with the understanding that it shall guarantee that the bidder will not withdraw its bid during the period of sixty (60) days following the opening of bids; that if its bid is accepted, it will enter into a Contract with the Owner in accordance with a form of agreement acceptable to and approved by the Owner and that the required Performance and Payment Bonds will be given; and that in the event of the withdrawal of said bid within said period, or failure to enter into said contract and given said bonds within ten (10) days after it has received notice of acceptance of its bid, the bidder shall be liable to the Owner for the full amount of the bid guarantee as representing the damage to the Owner on account of the default of the bidder in any particular thereof. The bid bonds and checks will be returned to the bidders after the Owner and the lowest, responsive, responsible bidder have executed a contract. If the required contract has not been executed within sixty (60) days after the date of the opening of the bids, then the bond or check of any bidder will be returned upon its request, provided it has not been notified of the acceptance of its bid prior to the date of such request.

6. PERFORMANCE AND PAYMENT BOND

The Contractor shall furnish a performance bond and a labor and material payment bond each in the amount of 100% of the contract price. Said bonds shall be delivered to the Owner (in duplicate) and shall be approved by the Owner prior to the execution of a construction contract between the Contractor and the Owner. Bonds shall be City of Norfolk standard form and shall be in accordance with Section 33.1-76 of the Norfolk City Code. All costs of bonds shall be paid by the Contractor. A bond rider will be required should change orders increase the amount of the contract by \$100,000 or more.

7. NEGOTIATIONS WITH APPARENT LOW BIDDER

The City reserves the right to negotiate with the lowest, responsive, responsible bidder if the bid exceeds available funds. Negotiations may include reduction in bid price, modification and/or reduction in scope of the work, substitution of materials, or any other alterations to the work so that the low bid is reduced to within available funds including a reasonable fund balance for contingency funds to be available during the course of construction.

8. TIME OF COMPLETION

(a) Time is of the essence. All work shall be completed within **One Hundred Eighty (80)** calendar days from the Notice to Proceed. Work shall commence within (10) ten days from date of Notice to Proceed.

(b) Work shall not commence until the Contractor has received a fully executed copy of the Contract which authorizes the Work and has also received a Notice to Proceed issued by the authorized City representative. Work commenced prior to receipt of both a fully executed copy of the Contract and a written Notice to Proceed from an authorized City official shall be deemed unauthorized and such work will progress solely at Contractor's risk.

9. NON-DISCRIMINATION CLAUSE

The Contractor agrees to comply, and to require all suppliers and subcontractors paid in whole or in part from funds made available under this contract to comply with Section 122(a)(1) of the State and Local Fiscal Assistance Act of 1972 (P. L. 92-512), as amended, to wit:

"No person in the United States shall, on the grounds of race, color, national origin, or sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity of a State government or unit of local government, which government or unit receives funds made available under Subtitle A (of Title I of the Act.)

Any prohibition against discrimination on the basis of age under the Age Discrimination Act of 1975 or with respect to an otherwise qualified handicapped individual as provided in Section 504 of the Rehabilitation Act of 1973 shall also apply to any such program or activity.

Any prohibition against discrimination on the basis of religion, or any exemption from such prohibition, as provided in the Civil Rights Act of 1964 or Title VIII of the Act of April 11, 1968, hereafter referred to as the Civil Rights Act of 1968, shall also apply to any such program or activity."

Further, the Contractor agrees to comply with Section 33.1-53 of the Code of the City of Norfolk, Virginia 1979, as amended, regarding prohibited employment discrimination.

10. MINORITY BUSINESS CLAUSE

It is the policy of the City of Norfolk to facilitate the establishment, preservation, and strengthening of small businesses and businesses owned by women and minorities and to encourage their participation in the City's procurement activities. Toward that end, the City encourages these firms to compete and encourages non-minority firms to provide for the participation of small businesses and businesses owned by women and minorities through partnerships, joint ventures, subcontracts, and other contractual opportunities. Bidders (offerors) are asked, as part of their submission, to describe any planned use of such businesses in fulfilling this contract.

11. NON-COLLUSION AFFIDAVIT

(a) Every bidder, by submitting a bid, shall be deemed to covenant, with regard to said bid, as follows:

(1) that said bid was arrived at independently without collusion, consultation, communication, or agreement

for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

(2) that, unless otherwise required by law, the prices which have been quoted in the bid submitted have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor.

(3) that no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

A bid shall not be considered for award nor shall any award be made where the bidder shall have failed to comply with a(1), a(2), or a(3) above.

(b) Every bidder, in addition to making the above covenants (a)(1), (a)(2) and (a)(3) will be required to provide the City of Norfolk, with the bid submitted, the affidavit contained herein.

(c) Every bidder will be required to disclose, with the submitted bid, the following information:

(1) the correct mailing address of the bidder.

(2) if a corporation, the name and current mailing address of the President, the Secretary and the Treasurer of the corporation.

(3) if a partnership, proprietorship or other firm, the name and current mailing address of each partner, proprietor or member of said firm.

(4) whether or not the bidder is associated with; owns, in whole or in part; or is owned, in whole or in part, or is a subsidiary of, any other bidder.

(d) The fact that a bidder (1) has published price lists, rates or tariffs covering items included in the submitted bid; (2) has informed prospective customers of proposed or pending publication of new or revised price lists for such items; or (3) has sold the same items to other customers at the same prices being bid, does not constitute a disclosure within the meaning of Subparagraph 9(a).

(e) Any bid submitted by a corporate bidder shall be deemed to have been authorized by the Board of Directors of the bidder and such authorization shall be deemed to include the signing and submission of the bid and the execution of the affidavit required in (b) above as the acts and deeds of the corporation.

12. SUBSTANCE ABUSE AND DRUG-FREE WORK PLACE

The Contractor agrees to comply with Section 33.1-58 of the Code of the City of Norfolk, Virginia, 1996, as amended, regarding substance Abuse and Drug-Free Work Place Policy.

End of Page

Bids to be opened: **2:00 p.m., Tuesday
April 5, 2016**
Work to be Completed in: **180 calendar days**
Liquidated Damages: **\$1,000.00 per day**
Performance Bond: **100%**
Payment Bond: **100%**
Bid Bond: **5%**

BID FORM

To: City of Norfolk
Department of Public Works
810 Union Street, Room 700
Norfolk, Virginia 23510

A. LUMP SUM BID

In compliance with the Invitation for Bids and Instructions to Bidders, the General Conditions of the Contract (as amended), the contract drawings and specifications titled **STORMWATER PUMP STATION NO. 1 MOTOR REPLACEMENT** and all addenda issued to date, all of which are part of this bid, the undersigned hereby proposes to furnish all items, including materials, labor, and equipment called for by, and in strict accordance with Contract Documents for the sum of:

\$ _____
(Use words)
_____ Dollars (\$ _____)

B. ADDENDA

The undersigned acknowledges receipt of the following addenda:

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

We agree to enter into a contract with the City of Norfolk, Virginia within ten (10) days of the award of same to us for the price named in our bid.

It is expressly agreed by us that the City of Norfolk, Virginia shall have the right to reject any and all bids and to waive any informalities.

In default of the performance on our part of the conditions of bid, our failure to enter into a contract with the City of Norfolk, Virginia, within the time above set, we herewith furnish a certified check, cashier's check (or Bid Bond) in the amount of \$ _____, which shall be forfeited as liquidated damages to the City of Norfolk, Virginia, but otherwise the said check or Bid Bond shall be returned.

We agree to begin work at any time after receipt of the Notice to Proceed from the Director of Public Works and substantially complete all of the Work within **One Hundred Eighty (180) consecutive calendar days** from the Notice to Proceed.

C. Norfolk Businesses: It is the policy of the City to support Norfolk businesses and workforce development and it encourages companies with corporate offices in Norfolk and which employ Norfolk residents to compete for City contracts. Bidders are asked, as part of their submission, to advise of their Norfolk location and detail their employment of Norfolk residents.

D. Equal Opportunity Business Development: It is the policy of the City of Norfolk to facilitate the establishment, preservation, and strengthening of small businesses and businesses owned by women and minorities and to encourage their participation in the City's procurement activities. Toward that end, the City encourages these firms to compete and encourages non-minority firms to provide for the participation of small businesses and businesses owned by women and minorities through partnerships, joint ventures, subcontracts, and other contractual opportunities. Bidders (offerors) are asked, as part of their submission, to describe any planned use of such businesses.

1. Is your firm a minority owned business? Yes ___ No ___ If yes, please check the appropriate category: ___ African American (male), ___ African American (female), ___ Caucasian (female), ___ Hispanic (male), ___ Hispanic (female), ___ Asian American (male), ___ Asian American (female), ___ American Indian (male), ___ American Indian (female), ___ Eskimo (male), ___ Eskimo (female), ___ Aleut (male), ___ Aleut (female), ___ Other (male), ___ Other (female).

2. Subcontracting Opportunities for Small, Women Owned, Minority Business Enterprises and Disabled Veterans. All prime contractors are requested to furnish the following information regarding participation of small, women owned, minority business enterprises and disabled veterans:

a. Proposed Name of your Subcontractor(s):

b. Proposed Minority Category of Subcontractor(s) - please check the appropriate category(ies):

___ African American (male)	___ African American (female)
___ Hispanic (male)	___ Hispanic (female)
___ Asian American (male)	___ Asian American (female)
___ American Indian (male)	___ American Indian (female)
___ Eskimo (male)	___ Eskimo (female)
___ Aleut (male)	___ Aleut (female)
___ Other (male)	___ Caucasian (female)
	___ Other (female)

c. Proposed Amount of Subcontracts:

d. Proposed Description of commodity (i.e. masonry, hauling, insulation, etc.):

e. Proposed Description of Project:

f. Proposed Total value of awards to all subcontractors:

g. Proposed Total Number of minority subcontracts awarded:

h. If you do not propose the use of any subcontractors, please check here ____.

E. The undersigned has read all sections under "Instructions to Bidders."

F. **CONTRACTOR'S REGISTRATION AND SIGNATURE**

Registered Virginia Contractor Class and No. _____

City of Norfolk Business License No. _____

Contractor _____ Signed _____ (SEAL)

Date _____ Title _____

NOTE: If Bidder is a corporation, write state of incorporation under signature and if a partnership, give full names of all partners.

End of Page

AFFIDAVIT

City of Norfolk, Virginia project: **Stormwater Pump Station No. 1 Motor Replacement**

Bid Date: _____

STATE OF VIRGINIA

(City/County)

This day personally appeared before the undersigned, a Notary Public in and for the City/County and State aforesaid, _____, who having been first duly sworn

(name of owner, partner, president)

according to law, did depose and aver as follows:

(a) That he is _____
(owner, partner, president, etc.)

of _____
(insert name of contractor)

(b) That he is personally familiar with the bid of _____
(insert name of contractor)
submitted in connection with the above captioned City of Norfolk project.

(c) That said bid was formulated and submitted in good faith as the true bid of said bidder.

(d) That said bid in no manner violates the Sherman Antitrust Act (15 U.S.C. '1 *et seq.*), The Virginia Antitrust Act (n59.1-9.1 through n59.1-9.17 Code of Virginia, (1950), as amended) or the Conspiracy to Rig Bids to Government Act (nn59.1-68.8, Code of Virginia (1950), as amended.

And further this deponent saith not.

Affiant

Subscribed and sworn to before me this _____ day of _____, 20____.

My commission expires: _____, 20____

Notary Public

MAILING ADDRESS, FAX, TELEPHONE NUMBER and EMAIL OF BIDDER:

IF CORPORATION, PROVIDE NAME AND MAILING ADDRESS AS REQUIRED BELOW

PRESIDENT

SECRETARY

TREASURER

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IF PARTNERSHIP, PROPRIETORSHIP, OR OTHER FIRM, PROVIDE NAME AND MAILING ADDRESS OF EACH PARTNER, PROPRIETOR, OR MEMBER OF FIRM.

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COMPLIANCE WITH STATE LAW
AUTHORIZATION TO TRANSACT BUSINESS IN THE COMMONWEALTH

I. CERTIFICATION

- A. The Bidder/Vendor (Please fill in with your enterprise's complete name)

certifies that it is organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50.

The identification number issued to Bidder/Vender by the State Corporation Commission: _____

- B. Bidder/Vendor that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law shall describe why it is not required to be so authorized:

Bidder/Vendor: _____

Signed: _____

Title: _____

Date: _____

II. INSTRUCTIONS

- a. The Bidder/Vendor shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Vendor learns that its certification was

erroneous when submitted or has become erroneous by reason of changed circumstances.

- b. A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Bidder's/Vendor's responsibility. Failure of the Bidder/Vendor to furnish a certification or provide such additional information as requested by the appropriate City purchasing official may render the Bidder/Vendor non-responsible.
- c. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of a Bidder/Vendor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- d. The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Bidder/Vendor knowingly rendered an erroneous certification, in addition to other remedies available to the City, the appropriate City purchasing official may terminate the contract resulting from this solicitation for default.

End of Page

THE CITY OF NORFOLK, VIRGINIA

OFFICE OF THE CITY MANAGER

CONTRACT

THIS AGREEMENT, made as of the ____ day of _____ in the year **2016**, is between the **City of Norfolk, Virginia**, acting by and through the City Manager, hereinafter styled the **City**, and

party of the second part, hereinafter styled the **Contractor**.

WITNESSETH, That whereas the City has awarded to the Contractor, in accordance with his bid of **April 5, 2016** a contract for **STORMWATER PUMP STATION NO. 1 MOTOR REPLACEMENT** as described in specifications and drawings prepared therefor by **Timmons Group, 2901 S. Lynnhaven Rd, Suite 200, Virginia Beach, Virginia 23452** and the City of Norfolk, and on file in the office of the Director of Public Works of the City of Norfolk, Virginia.

ARTICLE 1 - THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 2 - DATE OF COMMENCEMENT AND COMPLETION TIMES

The Contractor further agrees to begin Work at such a date as the Director, Department of Public Works, Norfolk, Virginia, shall notify it to begin via a Notice to Proceed letter, and that it will achieve Substantial Completion of the entire Work in accordance with Paragraph 9.8 of the General Conditions not later than **One Hundred Eighty (180) consecutive calendar days for Base Bid** from the date of commencement as well as achieve Final Completion in accordance with Paragraph 9.10 of the General Conditions not later than **Two Hundred Ten (110) consecutive calendar days** from the date of Notice to Proceed.

ARTICLE 3 - LIQUIDATED DAMAGES

The Contractor and the City recognize that time is of the essence of this Agreement. In view of the difficulty of ascertaining the loss which the City will suffer by reason of delay in the performance of the Work, the Contractor and the City hereby agree upon as the liquidated damages set below that the City will suffer by reason of delay and/or default, and not as a penalty. Further, the City shall deduct and retain the amount of such liquidated damages out of the moneys which may be due or become due to the Contractor under this Agreement.

Accordingly, should the Contractor fail to achieve Substantial Completion the aforesaid Work in accordance with the contract documents to the satisfaction and approval of the Engineer within the time stipulated in Article 2 above, the Contractor shall pay to the City of Norfolk, Virginia, **One Thousand Dollars (\$1,000.00)** for every calendar day beyond the time set for substantial completion.

After Substantial Completion, if the Contractor shall neglect, refuse, or fail to complete the remaining Work within the contract time or any proper extension thereof granted by the City, the Contractor shall pay the City **Seven Hundred Fifty Dollars (\$750.00)** for every calendar day beyond the time set for final completion until the Work is completed and ready for final payment.

ARTICLE 4 - CONTRACT PRICE

The City shall pay the Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined below subject to additions and deductions as provided in the Contract Documents:

For all Work other than Unit Price Work, a lump sum of:

_____ **Dollars and ____ Cents (\$XXX.XX)**

All specific cash allowances are included in the above price and have been computed in accordance with Paragraph 3.8 of AIA A201-2007, General Conditions of the Contract for Construction (as modified).

ARTICLE 5 - PAYMENTS

Based upon applications for payment submitted to the Engineer by the Contractor and certificates for payment issued by the Engineer, the City shall make monthly progress payments on account of the contract sum to the Contractor as provided in the conditions of the contract as follows:

The City will pay the Contractor, on or about the thirtieth calendar day after receipt of a Request for Payment, ninety-five percent (95%) of the portion of the contract sum properly allocable to labor, materials, and equipment incorporated in the Work and ninety-five percent (95%) of the portion of the contract sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing by the parties, less the aggregate of previous payments in each case; provided, however, that the owner, at any time after fifty percent (50%) of the Work has been completed, if it finds that satisfactory progress is being made, may make any of the remaining partial payments in full; and upon final completion, a sum sufficient to increase the total payment to one-hundred percent (100%) of the contract sum, less such retainage as the Engineer shall determine for all incomplete Work and unsettled claims. But such full payment or payments shall in no manner be construed as reducing the amount of the bond, or the liability of the surety thereon, until final completion and acceptance of all items of Work herein set forth.

The action of the Engineer by which the Contractor is to be bound according to the terms of this contract shall be that evidenced by his final estimate and certificate, all prior estimates upon which ninety-five percent (95%) or more may be made, being merely payment on account, and not payments for accepted Work, and subject to the correction of such final estimate, which may be made with notice to the Contractor.

ARTICLE 6 - CONTRACTOR'S REPRESENTATION

To induce the City to enter into this Contract, the Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and other related data

identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site which have been provided with the Contract Documents, and (2) reports and drawings of a hazardous environmental condition, if any, at the site, which have been provided with the Contract Documents.

E. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work.

F. Contractor is aware of the general nature of Work to be performed by City and others at the Site that relates to the Work as indicated in the Contract Documents.

G. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor

H. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

I. Contractor hereby certifies that it has familiarized itself with Sections 33.1-86 through 33.1-93 of the Code of the City of Norfolk, Virginia, 1979, as amended, entitled "Ethics in Public Contracting," including the additional statutes set forth in Section 33.1-86 thereof, and further that all amounts received by the Contractor pursuant to this Agreement are proper and in accordance therewith.

J. Contractor hereby certifies that at all times during which any term of this Agreement is in effect, it does not and shall not knowingly employ any unauthorized alien. For purposes of this section, an "unauthorized alien" shall mean any alien who is neither lawfully admitted for permanent residence in the United States nor authorized to be employed by either Title 8, section 1324a of the United States Code or the U.S. Attorney General.

K. Contractor hereby represents that it is organized as a stock or non-stock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership and is authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 or as otherwise required by law.

ARTICLE 7 - CONTRACT DOCUMENTS

The Contract Documents consist of the following:

- a. Invitation for Bids
- b. Instructions to Bidders
- c. Bid Form/Affidavit
- d. Bid Bond
- e. Contract
- f. Performance Bond
- g. Payment Bond
- h. AIA A201-2007, "General Conditions of the Contract for Construction" (as modified)
- i. Certificate of Insurance
- j. Notice of Award
- k. Notice to Proceed
- l. Change Orders (if any)
- m. Other Documents as may be required by law or appended hereto
- n. Plans and Drawings prepared by: **Timmons Group, 2901 S. Lynnhaven Rd, Suite 200, Virginia Beach, Virginia 23452**
- o. Specifications prepared or issued by: **Timmons Group, 2901 S. Lynnhaven Rd, Suite 200, Virginia Beach, Virginia 23452**
- p. Addendum (as listed in Bid Form)

Witness the following signatures and seals:

(*Contractor*)

Witness: _____

By: _____

Written Signature

Printed Signature

Seal
If
Incorporated

Title

Date

Virginia State Contractor's License No. _____

City of Norfolk Business License No. _____

Contents Approved:

Director of Public Works

Approved as to form and correctness:

Deputy City Attorney

CITY OF NORFOLK, VIRGINIA

Attest: _____

City Clerk

By _____

City Manager

Certification of Funds

I hereby certify that the money required for this contract (agreement, obligation or expenditure) is in the City Treasury to the credit of the fund from which it is to be drawn, and not appropriated for any other purpose.

Account: _____

Amount: _____

Contract No.: _____

Vendor Code: _____

Director of Finance

Date

End of Page

PERFORMANCE BOND

Bond No. _____

Amount: \$ _____

KNOW ALL PERSONS BY THESE PRESENTS, that _____ of _____ hereinafter called the Contractor and _____, a corporation duly organized and existing under and by virtue of the laws of the State of _____, hereinafter called the Surety, and authorized to transact business within the Commonwealth of Virginia as the Surety, are held and firmly bound unto the City of Norfolk as Owner, in the sum of _____ Dollars and ____ Cents (\$_____.__), lawful money of the United States of America, for payment of which, well and truly be made to the Owner, the Contractor and the Surety bind themselves and each of their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents as follows:

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT:

WHEREAS, the Contractor has executed and entered into a certain Contract, hereto attached, with the Owner dated _____, 2016 for

STORMWATER PUMP STATION NO. 1 MOTOR REPLACEMENT

NOW THEREFORE, if the Contractor, and its successors and assigns, shall at all times duly, promptly, and faithfully perform the Work and any alteration in or addition to the obligations of the Contractor arising thereunder, including the matter of infringement, if any, of patents or other proprietary rights, and shall assure all guarantees against defective workmanship and materials, including the guarantee period following final completion by the Contractor and final acceptance by the Owner and comply with all the covenants therein contained in the Specifications, Drawings, and other Contract Documents required to be performed by the Contractor, in the manner and within the times provided in the Agreement, and shall fully indemnify and save harmless the Owner from all costs and damage which it may suffer by reason or failure to do so, and shall fully reimburse and repay it all outlay and expenses which it may incur in making good any default, and reasonable counsel fees incurred in the prosecution of or defense of any action arising out of or in connection with any such default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract Documents or to the Work to be performed thereunder, or payment thereunder before the time required therein, or waiver of any provision thereof, or assignment, subletting or transfer thereof or any part thereof, shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, addition to the terms of the Contract Documents or any such payment, waiver, assignment, subcontract or transfer.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

Whenever Contractor shall be declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Owner shall have the right, at its option, to require the Surety to promptly proceed to remedy the default within 30 days of notice by proceeding or procuring others to proceed with completing the Agreement with its terms and conditions including the correction of any defective work and the provision of safety measures required as the result of such default; and all reserves, deferred payments, and other funds provided by the Agreement to be paid to Contractor shall be paid to Surety at the same times and under the same conditions as by the terms of that Agreement such fund would have been paid to Contractor had the Agreement been performed by Contractor; and Surety shall be entitled to such funds in preference to any assignee of Principal of any adverse claimant. Notwithstanding the above, the Owner shall have the right, with the approval of the Surety which shall

not be unreasonably withheld, to take over and assume completion of the Agreement and be promptly paid in cash by the Surety for the cost of such completion less the balance of the Contract price.

IN WITNESS WHEREOF, all above parties bounded together have executed this instrument this _____ day of _____, **2016**, the name and corporate seal of each corporate party being hereto affixed and those presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR

(_____)

By: _____(Seal)

Printed Name: _____

Title: _____

Attest

SURETY

By: _____(Seal)

Attest

APPROVED AS TO FORM: _____, 2016

City of Norfolk, OWNER

By: _____
Deputy City Attorney

NOTE: Date of Bond shall not be prior to the date of the Agreement. If the Contractor is a partnership, all partners shall execute the Bond.

IMPORTANT: The Surety named on this Bond shall be one who is licensed to conduct business in the Commonwealth of Virginia, and named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent shall be accompanied by a certified copy of the authority to act for the Surety at the time of signing of this Bond.

End of Page

PAYMENT BOND

Bond No. _____

Amount: \$ _____

KNOW ALL PERSONS BY THESE PRESENTS, that _____ of _____, hereinafter called the Contractor and _____, a corporation duly organized and existing under and by virtue of the laws of the State _____, hereinafter called the Surety, and authorized to transact business within the Commonwealth of Virginia as the Surety, are held and firmly bound unto the City of Norfolk as Owner, in the sum of _____ **Dollars and ____ Cents** (\$ _____), lawful money of the United States of America, for payment of which, well and truly be made to the Owner, the Contractor and the Surety bind themselves and each of their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents as follows:

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT:

WHEREAS, the Contractor has executed and entered into a certain Agreement, hereto attached, with the Owner dated _____, 2016 for

STORMWATER PUMP STATION NO. 1 MOTOR REPLACEMENT

NOW THEREFORE, if the Contractor shall promptly make payments to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in the Agreement, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, repairs on machinery, equipment, and tools consumed, used or rented in connection with the construction of the Work, and all insurance premiums on the Work, and for all labor performed in the Work, whether by Subcontractor or otherwise, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract Documents or to the Work to be performed thereunder, shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract Documents.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, all above parties bounded together have executed this instrument this ____ day of _____, **2016**, the name and corporate seal of each corporate party being hereto affixed and those presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR

(_____)

By: _____ (Seal)

Printed Name: _____

Title: _____

Attest

SURETY

By: _____(Seal)

Attest

APPROVED AS TO FORM: _____, 2016

City of Norfolk, OWNER

By: _____
Deputy City Attorney

NOTE: Date of Bond shall not be prior to the date of the Agreement. If the Contractor is a partnership, all partners shall execute the Bond.

IMPORTANT: The Surety named on this Bond shall be one who is licensed to conduct business in the Commonwealth of Virginia, and named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent shall be accompanied by a certified copy of the authority to act for the Surety at the time of signing of this Bond.

End of Page



AIA®

Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Stormwater Pump Station No. 1 Motor Replacement

THE CITY OF NORFOLK, a municipal corporation of the Commonwealth of Virginia,
hereinafter called the "City" or the OWNER:

(Name, legal status and address)

This document has important
legal consequences.

Consultation with an attorney
is encouraged with respect to
its completion or modification.

THE ARCHITECT:

(Name, legal status and address)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them ~~as being necessary to produce the indicated results, or from prevailing custom or trade usage as being required to produce the intended result whether or not specifically called for at no additional cost to the Owner.~~

§ 1.2.1.1 Should any conflict be found in the Contract Documents, the Architect/Engineer shall interpret or construe the Contract Documents so as to secure the most substantial and complete performance of the Work. In other words, the better quality or great quantity of work shall be provided in accordance with the Architect/Engineer's interpretation. The Architect/Engineer's decision in this matter shall be final.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 Wherever in the Contract Documents the words "as approved", "as directed", "as required", "acceptable", "satisfactory" and words of like import are used with references to the Work or its performance, and without further qualification, it shall mean as approved, as directed, as required by the Architect/Engineer and acceptable, satisfactory, etc. to the Architect/Engineer.

§ 1.2.5 The general character of the detailed work is shown on the Drawings, but minor modifications may be made on the shop drawings or mock-ups. Any details shall be worked out in relation to their location and their connection to other parts of the Work. Where on any drawings a portion of the Work is drawn out and the remainder is indicated in outline, the parts drawn out also apply to all other like portions of the Work. Where details or conditions are indicated but started only, such details or conditions shall be continued throughout the courses or parts in which they occur and shall also apply to all other similar parts in the Work unless otherwise indicated or specifically noted.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

Wherever the term "Architect" appears in this Agreement, it shall mean either Architect or Engineer.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The drawings, specifications and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the drawings, specifications and other documents prepared by the Architect or the Architect's consultants, and unless otherwise indicated the Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, them, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, in addition to the copyrights. All copies of Instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The drawings, specifications and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. As such, the City is hereby declared sole-owner of these documents in regards to this Project and will abide by the limitations described in Subparagraph 1.5.1. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service, are authorized to use and reproduce applicable portions of the drawings, specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the drawings, specifications and other documents prepared by

the Architect and the Architect's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

~~§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.~~

§ 1.5.2. Intentionally Omitted.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

~~§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~

§ 2.2.1. Intentionally Omitted.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise specified, the following applies:

a. Water line taps, construction of pits for water taps and meter, and restoration of the area to its original condition shall be performed by the Contractor at its expense. Only new water meters shall be installed by City forces at the expense of project sponsor (i.e. the City or private developer). All the aforementioned shall be coordinated by the Contractor.

b. Sanitary taps and cleanouts shall be done by the Contractor or its Subcontractor at the Contractor's expense. HRSD tap fees will be paid by the Owner.

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c. For gas and electrical work and associated meter installations, the Contractor shall be responsible for complete coordination of work with utilities, including provision of all necessary labor, equipment, and materials as required in the Contract Documents as well as payment of all resulting costs to aforesaid Work.

d. For telephone and cables, the Contractor shall be responsible for coordination of telephone trunk lines and cable installation with telephone/television company to the "point of penetration" to the facility, including provision of all necessary labor, equipment, and materials as required in the Contract Documents as well as payment of resulting costs to all aforesaid work.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the ~~Owner~~ Owner, subject to Subparagraph 3.74, but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.3.1 The Contractor shall be responsible for protecting pins, stakes, marks, hubs, and control points. Replacement of damaged or destroyed pins, stakes, marks, hubs or control points shall be conducted under the supervision of a surveyor licensed in the Commonwealth of Virginia, if required by the City, and at the Contractor's expense. The Contractor shall coordinate with the Survey Division of the Department of Public Works (664-4645) prior to resetting of points and shall provide certified documentation to include the reference/recovery sheet with swing ties for new benchmarks.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.(1) CD containing the drawings, specifications, and addendums, in PDF format, free of charge.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. ~~failure.~~ If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. Any failure by the Contractor to acquaint himself with such information shall not relieve him from the responsibility for successfully performing the Work.

.1 Dimensions of Work shall not be determined by scale or rule, but figured dimensions shall be used at all times.

.2 The Contractor shall verify all dimensions by measurement at the jobsite, and shall take any and all other measurements necessary to verify the drawings and to properly layout the Work.

.3 The study of the Contract Documents by the Contractor shall be made sufficiently in advance of the actual layout of the work so as to allow the Contract Documents to be interpreted or modified by the Architect.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions issued by the Architect in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs these obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, or for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities. Documents unless the Contractor recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect..

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means,

methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

a. Substituted Materials. Request for approval of any substituted material and equipment for those specified or shown on the drawings shall be made in writing to the Engineer within 30 days after award of the Contract. If this request is not submitted, the Engineer reserves the right to have the Contractor furnish the material and equipment definitely specified or shown on the plans. The Contractor shall show, in writing, the monetary savings, improvement in quality, time savings, and other factors to be gained from the proposed substitute. Approval of substitute materials and equipment will be at the sole discretion of the Engineer.

b. Or Equal. It is not the intent of these specifications to exclude or omit products or any responsible manufacturer, if said products are equal in every respect to those mentioned herein. Whenever an article, or any class of materials is specified by trade name or by name of any particular patentee, manufacturer or dealer, it shall be taken as intending to mean equal thereto in quality, finish, size, durability and equally as serviceable for the purpose for which it is or they intended. Request for approval of any "equal" material or product for those specified or shown on the drawings shall be made in writing to the Engineer within 30 days after award of the Contract. If this request is not submitted, the Engineer reserves the right to have the Contractor furnish the material and products definitely specified and shown on the plans. The Contractor shall show, in writing, that the material or product being proposed is equal in every respect to that specified and shall provide all necessary supporting documentation requested by the Engineer. The quality shall be determined by the Engineer, and he alone shall be sole judge as to what materials or services will be accepted as equal. No substitution of materials, methods or services specified shall be made without written approval from the Engineer.

c. Materials and Equipment Manufacturer's Recommendation. All materials, equipment or other items specified by trade or manufacturer's name shall be handled, installed, erected or connected in strict conformity with the manufacturer's recommendations and/or specifications. By making requests for substitutions, the Contractor:

1. Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

2. Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

3. Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs and time extensions related to the substitution which may subsequently become apparent; and

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4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. The Contractor shall be advised that there is NO permit fee for new construction, additions, etc. for CITY-OWNED BUILDINGS. Before final payment is made on the Project, Contractor shall demonstrate that the necessary inspections, certificates of occupancy, clearance, and/or acceptance from the City, State, Federal, and/or private entities/organizations such as from the City's Building Official, Corps of Engineers, Department of Environmental Quality, etc. have been obtained.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. Contractor shall not disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so "except in an emergency as required by Paragraph 10.4.. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. With respect to unforeseen Work that is paid on a Unit Price Basis, any adjustment in quantity and Contract price will be determined by the Architect/Engineer subject to the provisions of Subparagraph 15.1.5.3. Architect/Engineer will review with the Contractor the Architect/Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or

otherwise). If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.4.1 Possible Price and Times Adjustments. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Terms if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner in respect to Contract price and Contract times by the submission of a Bid or becoming bound under a negotiated contract; or

b. The existence of such condition could reasonably have been discovered or revealed as a result of examination, investigation, exploration, test, or study of the Site and contiguous areas required by the bidding requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give written notice within the time and as required by Subparagraph 3.7.4.

§ 3.7.4.2 Subsurface and Physical Conditions. The Contract Documents identify:

a. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that the Architect/Engineer has used in preparing the Contract Documents,

b. Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that the Architect/Engineer has used in preparing the Contract Documents.

§ 3.7.4.3 Limited Reliance by Contractor on Technical Data Authorized. Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data", if any, shall be identified in Supplementary General Conditions. Contractor may not rely upon or make any claim against Owner, Architect/Engineer, or any of the Architect/Engineer's consultants with respect to:

a. The completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor, and safety precautions and programs incident thereto; or

b. Any Contractor interpretation of or conclusion drawing from any "technical data" or any such data, interpretations, opinions, or information.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2. The Contractor shall attach with monthly invoices the original copy of sales invoices/receipts for materials or equipment that are covered under allowances.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner ~~with reasonable promptness in sufficient time to avoid delay in the Work.~~

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

1. The superintendent shall not be changed except with the consent of the Owner, unless the superintendent ceases to be in the Contractor's employ.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, and prior to mobilization or proceeding with any work on site, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.9.4 A qualified General Superintendent shall be present on the project site whenever work is being performed, unless otherwise authorized in writing by the Owner. The Contractor shall notify the Owner whenever the superintendent will be absent for four hours or more. This notification shall include the name of the designated substitute. Any substitute shall be familiar with the project and have the same authority of the primary superintendent. Verbal notification is acceptable for periods less than one full workday.

1. The qualified General Superintendent shall remain on site each day throughout all work days whenever contract work is performed through the punch list period and until all punch list items are complete. Lack of supervision shall constitute a reduction in the Contract Amount of General Conditions, Supervision, or other category which solely represents at the General Contractor's work responsibility, in the amount of \$250.00 per day, or any portion of a day, based on the amount indicated.

§ 3.9.5 The superintendent shall serve as a day to day point of contact on the Project for the Owner and shall, as a minimum, have the authority to:

a. Act on behalf of the Contractor;

b. Direct the work of Subcontractors;

c. Respond to directed changes in the schedule;

d. Provide detailed updates to and respond to inquiries from the Owner on the progress of the work;

e. Act upon verbal and written notification of non-conforming work;

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f. Respond to any complaints regarding the conduct or actions of any employee of the Contractor or any Subcontractor.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. At the Pre-Construction Conference, the Contractor shall submit to the Engineer for its timely review a preliminary construction schedule indicating the times (number of days or dates) for starting and completing the various stages of the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

1. The progress schedule shall be in the form of a bar graph and shall identify each major or critical activity. The progress schedule shall be updated monthly. Five (5) copies of the updated progress schedule shall be submitted with each Application for Payment.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

1. Reproduction of the Contract Drawings, or any portion thereof, shall not be acceptable.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal

schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

The Contractor, within 15 days from the Notice to Proceed, shall submit to the Engineer for approval, a complete schedule of submittals for shop drawings and technical and/or engineering data sheets covering all items and equipment for this Contract as listed in each respective division. Submit for approval six (6) copies of certified Shop Drawings and technical data sheets plus sufficient copies for Contractor's use. Approval of the above submissions shall not relieve the Contractor from complying with the drawings and specifications, nor shall such approval be construed as a guarantee of the accuracy of dimensions or other covered items. The Engineer shall endeavor to process all drawings, data sheets, etc., within 21 calendar days of receipt unless impractical. Except for construction schedule and schedule of values that need to be turned over directly to the City for review/approval, the Contractor shall forward all other submittals for review/approval to only one clearing house. The City will notify the Contractor during the Pre-Construction Conference where to send these submittals.

1. Unless otherwise directed or specified, samples shall be submitted in duplicate. Samples shall be properly labeled, bearing the name and quality of material, name of the manufacturer, name of Project, name of the Contractor and the date of submission.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, ~~or will do so and~~ (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. All copies of Shop Drawings submitted for approval shall bear the following statement: "Checked and certified correct for conformance with Contract Documents." This statement shall be dated and signed by the Contractor and shall appear on each submittal. One copy of each approved submittal shall be kept at job site at all times.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

1. The Contractor shall furnish to the field as many prints of the approved Shop Drawings as may be required.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear

such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.14.3 UNDERGROUND UTILITY DAMAGE PREVENTION ACT

The Contractor shall be required and agrees to comply with all the provisions of the Virginia Underground Utility Damage Prevention Act (Section 56-265.14, et seq. Code of Virginia, 1950, as amended) and hereby agrees to hold the City of Norfolk harmless against any loss, damages or claims of any nature whatsoever arising out of the Contractor's failure to comply with the requirements of said Act.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project. In addition, immediately after the completion of the Work, or any portion thereof, the Contractor shall restore the facility, street, and surrounding area to a condition as clean as before the Work was begun. The drainage system shall also be inspected and cleaned by the Contractor. If done by the City or its agents, any expense the City may incur will be charged against the Contractor and deducted before Final Payment is made. The Contractor will be required to back fill along the edges of the sidewalks, driveways and curbs where settlement has occurred, and reshape and reslope where directed. Site must be maintained regularly according to State and City regulations, including regular grass cutting. During the progress of the Work, the sidewalks and portions of the streets adjoining the Work, or in its vicinity, must not be obstructed or littered, and the adjacent sidewalks and gutters must be kept clean as directed by the Engineer.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and ~~Owner shall be entitled to reimbursement from the costs thereof shall be charged to the Contractor.~~

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but

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shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity ~~that which~~ would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.1.1 The requirements of this Paragraph 3.18 shall be incorporated into the Contractor's insurance policies in a manner approved by the Owner.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

~~§ 4.1.1 The Owner shall retain an architect~~ architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture ~~in the jurisdiction where the Project is located. That person or entity is identified as the Architect identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative.~~

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

~~§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.~~

§ 4.1.3. Intentionally Omitted.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 As the Owner's Project representative, the Consulting Architect/Engineer's duties, responsibilities and limitations of authority shall be presented during the Pre-Construction Conference. The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.1.1 Engineer – An individual or entity having an Agreement with the Owner to furnish services as Owner's independent professional consultant with respect to the Project and who is identified as such in the Agreement.

§ 4.2.2 ~~The Architect~~ Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the the Contractor's

operations (1) to become familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, and ~~to determine in general if the Work observed is being performed in a manner indicating that~~ (2) to endeavor to guard the Owner against defects and deficiencies in the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will ~~not~~ neither have control over, charge of, or responsibility nor be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and

assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

§ 4.2.15 **PRE-CONSTRUCTION CONFERENCE.** Before starting the Work, the Architect/Engineer/Owner will schedule a conference to review the requirements on such matters as Project supervision and on-site inspection, Shop Drawing schedules and submission, progress schedules and reports, payrolls, payments to contractors, contract change orders, insurance, safety, labor provisions and equal opportunity in employment and any other items pertinent to the Project. Present at the conference will be the Architect/Engineer, Owner, Project Representative, the Contractor, and its Superintendent for the project.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, ~~as seen as~~ practicable within 15 days after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each ~~principal portion of the Work~~. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

~~§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.~~objection..

~~§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect.~~Architect, upon written notice of such intent, makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

~~§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that~~

- ~~.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and~~
- ~~.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.~~

~~When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract..~~

~~§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.~~

~~§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.~~

~~§ 5.4.3. Intentionally Omitted.~~

§ 5.5 SUBCONTRACTORS COORDINATION OF WORK

Every subcontractor performing work that affects others shall provide for all requirements of the other trades, notwithstanding the Contractor's responsibility to coordinate the Work. Should the work provided by unsuitable for the application of work by any other subcontractor, the subcontractor shall notify the Contractor and the Engineer in writing immediately. The Contractor is required to forward a copy of correspondence from his subcontractors providing notice of unsuitable work.

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ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. ~~If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15. subrogation..~~

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or between the Owner and Contractor; a Construction Change Directive may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.1.4 Modifications shall be in compliance with the Code of the City of Norfolk, Virginia, Chapter 33.1.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon; Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Architect/Engineer's recommendation to the City as follows:

Architect/Engineer will review with Contractor the Architect/Engineer's preliminary determinations on such matters before rendering a written recommendation thereon (by endorsement of an Application for Payment or otherwise). City's written decision thereon (by approval of Application for Payment or otherwise) will be final and binding (except as modified by Architect/Engineer to reflect changed factual conditions or more accurate data) upon Contractor, subject to the provisions of Paragraph 7.3.4.

Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted ~~adjusted~~ provided that there is no corresponding adjustment with respect to any other item of Work.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 ~~Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and Overhead and profit costs, except where such costs have been determined by means of Paragraph 7.3.3.2 above, wherein such costs are included in the unit prices, shall be determined as follows:~~

Fifteen percent (15%) of the costs determined above shall be paid for overhead and profit of the Contractor or subcontractor(s) actually performing the work, including, but not limited to, field and home office expense, superintendent, taxes, subsistence expenses of any nature, premiums on bonds, insurance, and all other costs and expenses as determined by the City.

In the event the work is performed by a subcontractor or subcontractors, the Contractor shall be paid ten percent (10%) of the total costs determined above, excluding the subcontractor's or subcontractors' overhead and profit, to cover and compensate the Contractor for its overhead and profit;

- .5 ~~Additional costs of supervision and field office personnel directly attributable to the change.~~
Intentionally Omitted.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. ~~Architect plus overhead and profit to actual net cost.~~ When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may not request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15. Contractor may only include the amounts of fully executed Change Orders in the Applications for Payment.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the ~~Owner pending mediation and arbitration;~~ Owner; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

Based upon Applications for Payment submitted to the Engineer by the Contractor and certificates for payment issued by the Engineer, the City shall make monthly progress payments on account of the Contract Sum to the Contractor as provided in these General Conditions of the Contract for Construction as follows:

The City will endeavor to pay the Contractor, on or about the thirtieth (30th) calendar day after receipt of Request for Payment, ninety-five (95%) percent of the portion of the Contract Sum properly allocated to labor, materials and equipment incorporated in the work and ninety-five (95%) percent of the portion of the Contract Sum properly allocated to materials and equipment suitably stored at the site or at some other location agreed upon in writing by the parties, less the aggregate of previous payments in each case; provided however, the City, at any time after fifty (50%) percent of the work has been completed, if it finds that satisfactory progress is being made, may in its sole discretion make any of the remaining partial payments in full. Also, upon Substantial Completion of the work, the City may increase total payment to one hundred (100%) percent of the Contract sum, less such retainage as the Engineer shall determine for incomplete work and unsettled claims. But such full payment or payments shall in no manner be construed as reducing the amount of the bond or the liability of the Surety thereon, until Final Completion and acceptance of all lines of work herein set forth. Final Payment shall be made upon completion of all work and acceptance by the Engineer in accordance with the General Conditions.

The action of the Engineer by which the Contractor is to be bound according to the terms of this Contract shall be evidenced by his final estimate and certificate, all prior estimates upon which ninety-five (95%) percent or more may be made, being merely payments on account, and not payments for accepted work, and subject to the corrections of such final estimate, which may be made without notice to the Contractor thereof, or of the measurements upon which the same is based.

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be ~~notarized, if required, certified by an~~ officer of the firm and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may not include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, ~~or by interim determinations of the Architect,~~ but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such

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materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.
- .8 failure to comply with obligations under the Contract.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld. The City reserves the right to determine payment made.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor ~~shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner is obligated to take one of the two following actions within seven (7) days after receipt of amounts paid to the Contractor by the Owner for work performed by any subcontractor under this Agreement:~~

a. Pay the subcontractor for the proportionate share of the total payment received from the Owner attributable to the work performed by the subcontractor under this Agreement; or

b. Notify the Owner and the subcontractor, in writing, of the Contractor's intention to withhold all or a part of the subcontractor's payment with the reason for nonpayment.

The Contractor is obligated to pay interest to the subcontractor on all amounts owed by the Contractor to the subcontractor that remain unpaid after seven (7) days following receipt by the Contractor of payment from the Owner for work performed by the subcontractor under this Agreement. Unless otherwise provided under the terms of this Agreement, interest shall accrue at the rate of one percent (1%) per month.

The Contractor shall include in each of its subcontracts, if any are permitted, a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier subcontractor.

The Contractor's obligation to pay an interest charge to a subcontractor pursuant to this section may not be construed to be an obligation of the City. A contract modification or Amendment to the Agreement may not be made for the purpose of providing reimbursement for such interest charge. A cost reimbursement claim may not include any amount for reimbursement for such interest charge.

§ 9.6.3 ~~The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor. A Subcontractor inquiry for progress payment and other information shall be directed to the City Attorney's office under the Freedom of Information Act.~~

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by

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the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

~~If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start up, plus interest as provided for in the Contract Documents.~~ Intentionally Omitted.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. The Contractor shall submit a Contractor's release from liens, claims, security interests or encumbrances along with final invoice. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction. The Contractor shall provide temporary fences, barricades, coverings, or other protection to preserve existing items indicated to remain and to prevent injury or damage to persons or property.

This includes providing protection of the Work, materials, appliances and fixtures against weather, rain, wind, storms, freezing or heat. At the end of the day's work, work likely to be damaged shall be properly protected. For work on existing buildings, the Contractor shall accomplish the work in such a manner that the remainder of the building, and its contents and inhabitants, are fully protected from any weather damage.

The Contractor shall be responsible for ensuring that adequate measures are taken to secure materials and equipment during the progress of the Work to prevent storm-related hazards. It is, therefore, essential that the Contractor take necessary precautions to ensure that openings in the building are monitored carefully. The Contractor shall take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday; and ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

The provisions of this subparagraph take precedence over any similar provisions contained in the technical specifications.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

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§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. ~~If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection.~~ Owner. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner ~~direction by the City~~ and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

~~§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.~~

§ 10.3.3. Intentionally Omitted.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site ~~unless such materials or substances are required by the Contract Documents.~~ site. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

§ 10.4.1 EMERGENCY CONDITIONS. The issuance of a Declaration of Emergency conditions by any authorized government official may result in the suspension of the Work under the Contract and/or the ordering by the City of additional work. The Contractor shall make available to the City, during the time of the declared emergency, labor and equipment for such services under the terms and conditions of the Contract. Labor and equipment rates shall not exceed FEMA reimbursable rates for the Hampton Roads area. Failure to comply with such emergency directives may result in termination of the Contract by reason of non-compliance.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

See Subparagraphs 3.18.1 and 10.3.1

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability. All liability policies shall be written in an occurrence form unless otherwise specifically approved by the City.

The Contractor shall secure and maintain in force insurance, including malicious mischief and vandalism, with minimum acceptable amounts described below, naming the City as additional insured during the life of the Contract:

.1	Worker's Compensation	Statutory
	Employer's Liability	\$200,000 per accident injury
.2	Commercial General Liability	Combined single limit \$3,000,000 or
		\$2,000,000 per occurrence
		\$3,000,000 aggregate
		\$3,000,000 products & completed
		Operations

The Commercial General Liability Insurance required above shall include the following extensions of coverage:

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- (1) The coverage shall be provided under a Comprehensive form of policy or similar thereto.
- (2) X.C.U. Coverage -- If the Contract requires any work procedures involving blasting, excavating, tunneling or other underground work, the liability coverage shall include Standard Blasting or Explosion Coverage, Standard Collapse Coverage and Standard Underground Coverage, commonly referred to as XCU liability coverage with limits of \$500,000 per occurrence and \$1,000,000 aggregate.
- (3) Broad Form Property Damage Endorsement.
- (4) Contractual Liability coverage shall be included.
- (5) Protective Liability coverage shall be included to protect the Contractor against claims arising out of operations performed by its Subcontractors.
- (6) Products Liability and/or Completed Operations coverage shall be included.

.3 Comprehensive Automobile Liability including owned, non-owned and hired vehicles:

Combined Single limit each accident	\$2,000,000
Bodily Injured	\$1,000,000 per person
	\$2,000,000 per occurrence
	\$2,000,000 aggregate
Property Damage	\$500,000 per occurrence

.4 Environmental Impairment Liability Insurance. If applicable, as determined by the City, the Contractor shall procure and maintain during the life of the Contract Environmental Impairment Liability Insurance, which shall protect against all claims and costs including, but not limited to, bodily injury or property damage claims (including clean-up costs) caused by pollution conditions, as herein defined, arising from the contracted work. Pollution conditions means the discharge, dispersal, release or escape of smoke vapor, soot, fumes, acids, alkalis, toxic chemicals, liquids, gases, waste materials or other irritants, contaminants, or pollutants into or upon land, the atmosphere or any watercourse or body of water, which results in bodily injury or property damage. The policy limits will be determined by the City and specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or as prescribed by City, State or Federal law/regulations. Coverages, written on a claims-made basis, shall be maintained without interruption from the date of commencement of the Work until at least one year following the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 All insurance policies required hereunder shall contain an express provision therein, or endorsement attached thereto, worded substantially as follows:

"This is not to be cancelled or become subject to reduction of coverage prior to thirty days after the insured has received written notice mailed to the address noted hereinbefore, as evidenced by return receipt of registered letter."

All insurance certificates and/or policies shall designate the City of Norfolk, its employees, and its agents as "additional insured" regarding the contracted Work.

Certificates of Insurance issued by companies licensed within the Commonwealth of Virginia shall provide the designed insurance.

Contractor shall notify the City in writing within 10 days after receiving notice of any cancellation or reduction in coverage.

Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies

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will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

~~§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.~~ **SUBCONTRACTOR'S INSURANCE.** The Contractor shall require all subcontractors to secure and maintain in force containing the same coverage and amounts as described in Subparagraph 11.1.2.

§ 11.2 OWNER'S LIABILITY INSURANCE

~~The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.~~
Intentionally Omitted.

§ 11.3 PROPERTY INSURANCE

~~§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project. Until the work is completed and accepted by the City, the Contractor shall purchase and maintain a Builder's Risk or property insurance as is appropriate upon the entire work at the Site to the full insurable value thereof.~~

~~§ 11.3.1.1 Property insurance shall be on an "all risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.~~

~~§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.~~

~~§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.~~

~~§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.~~

~~§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or~~

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companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.1.1. Intentionally Omitted.

§ 11.3.1.2. Intentionally Omitted.

§ 11.3.1.3. Intentionally Omitted.

§ 11.3.1.4. Intentionally Omitted.

§ 11.3.1.5. Intentionally Omitted.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

~~The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.~~ Intentionally Omitted.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished. A Performance Bond and Payment Bond Rider is required for all Change Orders that are in the amount of \$100,000 or greater; or, if the aggregate total of multiple Change Orders is equal to or greater than \$100,000.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties

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established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

~~§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.~~

~~§ 12.2.2.3. Intentionally Omitted.~~

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

~~Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.~~ Intentionally Omitted.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law,

but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

~~§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:~~

- ~~.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;~~
- ~~.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;~~
- ~~.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or~~
- ~~.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.~~

~~§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.~~

~~§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.~~

~~§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.~~

§ 14.1.1: Intentionally Omitted

- .1 ;
- .2 ;
- .3
- .4

§ 14.1.2. Intentionally Omitted.

§ 14.1.3. Intentionally Omitted

§ 14.1.4. Intentionally Omitted

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, ~~upon certification by the Initial Decision Maker that sufficient cause exists to justify such action,~~ may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not ~~executed~~ executed and costs incurred from this termination.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Decision of Owner. Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision, evaluation and recommendation. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision a final decision by the Owner shall be required as a condition precedent to mediation of any Claim litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker Architect with no decision having been rendered, rendered by the Owner. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide, evaluate disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker Architect will review Claims and within ten days of the receipt of a the Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject, recommend rejection of the Claim in whole or in part, (3) approve, recommend approval of the Claim, (4) suggest, recommend a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to

evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve/recommend ~~either rejection or approval of~~ the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will ~~render an initial decision~~ recommend approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The ~~initial Owner's~~ decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution subject to mediation or arbitration.

~~§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.~~

~~§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.~~

§ 15.2.6. Intentionally Omitted

§ 15.2.6.1. Intentionally Omitted.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

~~§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.~~

~~§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

~~§ 15.3.3~~ The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

~~§ 15.3.1. Intentionally Omitted.~~

~~§ 15.3.2... Intentionally Omitted.~~

~~§ 15.3.3... Intentionally Omitted.~~

§ 15.4 ARBITRATION

~~§ 15.4.1~~ If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

~~§ 15.4.1.1~~ A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

~~§ 15.4.2~~ The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

~~§ 15.4.3~~ The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

~~§ 15.4.1... Intentionally Omitted.~~

~~§ 15.4.1.1.. Intentionally Omitted.~~

~~§ 15.4.2. Intentionally Omitted.~~

~~§ 15.4.3. Intentionally Omitted.~~

§ 15.4.4 CONSOLIDATION OR JOINDER

~~§ 15.4.4.1~~ Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

~~§ 15.4.4.2~~ Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

~~§ 15.4.4.1. Intentionally Omitted.~~

~~§ 15.4.4.2.. Intentionally Omitted.~~

~~§ 15.4.4.3. Intentionally Omitted.~~

PART II

1. SCHEDULES AND REPORTS

Contractor shall submit for approval the following items in four (4) copies prior to commencing the Work:

- a. A complete, detailed construction progress schedule in weekly increments, showing anticipated start and completion of all sections of the Work. Also, see sections 3.10 and 3.10.1
- b. A complete list of Subcontractors
- c. A breakdown of the Project contract price for use in processing monthly requisitions.
- d. A projection of contract's monthly cash flow requirements for the duration of the Project.
- e. The above requirements may be waived for small projects at the discretion of the Engineer.

2. MINORITY PARTICIPATION

The Contractor shall notify the City in writing of the names of any minority and disadvantaged business subcontractors to be used on the Project, including the estimated dollar amount of such subcontract and the minority classification of such subcontractors. A minority and disadvantaged business is one that is at least 51% owned by an Asian American, Black, Hispanic, and American Indian, Eskimo, Aleut, or Female.

3. EROSION & SEDIMENT CONTROL

On construction projects that are required by the City's Erosion & Sediment Control ordinance (City Code Chapter 15) to have an approved erosion and sediment control plan, the Contractor shall be required to implement the approved plan and comply with all conditions of the plan. A copy of the approved plan and the Virginia Erosion and Sediment Control Handbook. (Third Edition, 1992) shall be kept at the City. If the Contractor determines that the approved plan cannot be effectively carried out, the Contractor shall be responsible for notifying the plan approving authority and requesting a plan amendment as provided for in the Virginia Erosion and Sediment Control Law (Code of Virginia Title 10.1, Chapter 5, Article 4, Section 10.1-563C).

4. RIGHT TO AUDIT

For cost-reimbursement contracts, change orders issued for fixed priced contracts or other contracts in excess of \$30,000, which include the provisions of services, the Contractor shall retain all books, records and other documents relative to this Contract for five (5) years after final payment or until audited by the Office of the City Auditors shall have full access to and the right to examine and duplicate any of said materials during said period.

~~§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.~~

SECTION 01000 SUMMARY OF WORK

1. GENERAL

1.01 DESCRIPTION

- A. This Section includes requirements of a general nature applicable to the Contract.
- B. The Work includes the replacement of three existing 125 HP electric motors with new premium efficiency motors and reduced voltage autotransformer (RVAT) starters. The existing soft starters shall be removed from service and new wire and conduit shall be installed under the existing floor to power the new RVAT's. Bypass pumping, traffic and all associated site work shall be included in the work. A new motor shaft shall also be provided for each new motor to insure proper alignment and tolerances with the existing pump shaft at the coupling.
- C. The contractor will be required to keep adequate bypass pumping available and coordinate with city staff and local weather conditions to prevent flooding of the pump station service area. The pump station will be allowed to be shut down up to 3 times for a period of 8 hours to complete electrical work associated with installation of new electrical equipment.. A bypass pumping system capable of handling 33,000 GPM will need to be designed, installed and maintained by the contractor for the duration of each electrical shut down. The bypass pumping plan will need to be submitted to the City for review and approval. The contractor will be responsible for the maintenance of the bypass pumping system and shall provide qualified oncall personnel available 24 hours a day to respond to alarms and emergencies.

1.02 REFERENCE DOCUMENTS

- A. Applicable Codes, Specifications, and Standards:
 - 1. All references to codes, specifications, and standards referred to in the Contract Documents shall be the latest edition, amendment and/or revision of such reference standard in effect as of the date of Bid Opening for this Contract.
- B. Documents on the Site
 - 1. The Contractor shall maintain, on the site, copies of all appropriate documents including codes, specifications, permits, and reference standards referred to for this project.

1.03 ABBREVIATIONS AND SYMBOLS

- | | |
|-----------|--|
| 1. AASHTO | American Association of State Highway and Transportation Officials |
| 2. ACI | American Concrete Institute |
| 3. ANSI | American National Standards Institute |
| 4. ASTM | American Society for Testing and Materials |
| 5. AWWA | American Water Works Association |
| 6. BOCA | Building Officials Code Administration, Inc. |
| 7. HRPDC | Hampton Roads Planning District Commission |
| 8. NACE | National Association of Corrosion Engineers |
| 9. NEC | National Electrical Code |

SECTION 01000 SUMMARY OF WORK

- 10. OSHA Occupational Safety and Health Administration
- 11. VDOT Virginia Department of Transportation
- 12. VSWCC Virginia Soil and Water Conservation Board

1.04 CONTRACTOR'S RESPONSIBILITIES

A. Use of Premises and Off-Site Work

- 1. Lands by Contractor - Any land and access thereto not furnished by the City that the Contractor deems necessary for the work, temporary construction facilities, access and egress, or for storage of materials shall be provided by the Contractor at no cost to the Owner. The Contractor shall confine his apparatus and storage to such additional areas as he may provide at his expense. The Contractor shall obtain permits and written approvals from the appropriate jurisdictional agency and or property owner for use of the premises not furnished as described above, and all off-site areas which include but are not limited to off-site borrow pits and waste areas. Such permits and approvals must specify treatment of said areas during and at the completion of construction. Copies of all permits and approvals shall be furnished to the Engineer before utilization of the areas.
- 2. Private and Public Property - The Contractor shall not enter upon private property for any purpose without obtaining written permission from the property owner. Letters of permission from property owners shall be filed with the Engineer prior to entering private property.

- B. The Contractor shall not load nor permit any part of any structure to be loaded with weights that could endanger the structure, nor shall he subject any part of the work to stresses or pressures that could endanger it.

C. Public Convenience

- 1. The Contractor shall, at all times, so conduct his work as to insure the least possible obstruction to traffic and inconvenience to the Owner, the general public, and the businesses and residences in the vicinity of the work, and to insure the protection of persons and property. Temporary provisions shall be made by the Contractor to insure the proper functioning of the existing structure.

D. Measurements

- 1. All dimensions shown on existing work and all dimensions required for work that is to connect to existing work shall be verified by the Contractor by actual measurement of the existing work. Any discrepancies between the Contract Documents and the existing conditions shall be referred to the Engineer before any work affected thereby has been completed.

E. Coordination

- 1. Phases of the construction of the project which involve the temporary interruption of essential services (water, electricity, etc.) shall be scheduled in consultation with the Engineer, and shall be not of longer duration than essential to accomplish the purpose for such interruptions. Communication with the Engineer during these phases is critical in keeping all parties informed.
- 2. The Contractor shall notify the Engineer and the Owner not less than 48 hours in advance of commencing work. The Owner shall be given no less than 48 hours

SECTION 01000
SUMMARY OF WORK

notice in advance of the time and date of making any connections and will advise the Contractor as to a suitable time and date.

SECTION 01000 SUMMARY OF WORK

Contractor Checklist for Major Items to be Performed and/or Submitted

This checklist is intended to be a guide to assist the contractor in determining what items need to be submitted to the Owner/Engineer or what services need to be performed by the contractor. The checklist is not intended to be an all-inclusive list of services to be performed by the contractor, and does not relieve the contractor of the responsibilities stipulated within these specifications.

Required as Part of This Contract		Description of Submittal Item or Service to be Performed	Check Once Item is Completed
Yes		Diagram of location of fuel storage areas on plans	
Yes		Diagram of location of temporary sanitary Facilities on plans	
Yes		Statement of payment of taxes	
Yes		Affidavit of payment of debts and claims	
Yes		Affidavit of release of liens	
Yes		Construction schedule of work prior to the commencement of any work	
Yes		Updates of the construction schedule if work does not follow the original schedule	
Yes		Schedule of values (shows the value of each kind of work) prior to first application for payment	
Yes		Schedule of shop drawing submittals	
Yes		Schedule of estimated monthly payments (within 30 days after contract date)	
Yes		Material and products schedule (within 30 days after contract date)	
Yes		List of product substitutions (for a period of 30 days after contract date)	
Yes		All required permits (e.g., building permit, land disturbance permit, etc.)	
	No	Field office located at project site with the following equipment: Telephone Message recording unit Water and sanitary facilities Temporary field office for use by the Engineer that is approximately 150 square feet and includes: One stick file One drawing table One stool One non-folding desk chair One desk One four-drawer lockable filing cabinet	
Yes		Shop drawings and product data	
	No	Samples	
	No	Layout data/schedule for pipe joining and special connections	
	No	Copies of survey cut sheets	
Yes		Diary or log book recording significant construction activities, meetings, weather conditions, etc.	
Yes		Progress reports submitted with each application for payment	
	No	Test results (e.g., concrete cylinder tests, compaction tests, etc.)	
Yes		One signed original and 3 copies of inspections or approvals of work required to be inspected by local code or law	

SECTION 01000
SUMMARY OF WORK

	No	Project photographs (a minimum of 10 photos per month during contract) that include two glossy color prints (8 in. x 10 in.) and each negative	
Yes		Product guarantees, certificates, and warranties	
Yes		Contractor's one-year standard warranty for all work	
Yes		Operation and maintenance data manuals	
Yes		Spare parts and maintenance materials	
Yes		One complete set of contract drawings and one project manual recording all changes to the work to indicate actual installation	
Yes		Application and certificate for payment in appropriate format	
Yes		Monthly progress meetings	
	No	Preliminary inspection and testing (a demonstration that individual components of equipment/work have been completed) scheduled a minimum of 20 days before the pre-final inspection is scheduled.	
	No	Pre-final inspection (a demonstration that all individual project components function and are coordinated with other systems) scheduled a minimum of 20 days before the final inspection.	
Yes		Final inspection (a demonstration that all elements of the project are ready to be placed in operation and all work has been substantially completed) scheduled a minimum of 20 days before completion date.	
	No	Calibration test results performed by competent experienced test engineers	
Yes		Nameplates on all devices	
	No	Brass tags on each field mounted device	
Yes		List of manufacturers, suppliers, and subcontractors who participated in the construction of the project	

END OF SECTION

SECTION 01010 SITE CONDITIONS

1. GENERAL

1.01 DESCRIPTION

Existing facilities and structures are shown in accordance with the best available information. The Engineer and / or the Owner will not be responsible for the completeness or accuracy thereof nor for any deductions, interpretations, or conclusions drawn there from. Forty-eight hours in advance of work in the vicinity of existing facilities, the Contractor shall notify "Miss Utility" by calling 800-552-7001. The Contractor shall verify to his own satisfaction, the actual locations of existing facilities prior to construction in their vicinity.

1. Should the Contractor, in the course of his operations, encounter any underground utilities, the presence of which was not previously known or of a different type than shown, he shall immediately notify the Engineer and take all precautions necessary to support and protect the utility and maintain continuous service until said utilities can be adjusted by the appropriate owners or other corrective measures taken.
2. Relocations by others arranged by and for the convenience of the Contractor shall be at no additional cost to the Owner.
3. The Contractor shall be responsible for filing all requests with public utility corporations, jurisdictional agencies, or other owners to make all adjustments to public utility fixtures and appurtenances within or adjacent to the limits of construction. Furnish copies of all such requests and replies to the Engineer. The Contractor shall be responsible for coordinating his activities with said body. Additional costs resulting from a lack of coordination between the utilities and Contractor shall be at no additional cost to the Owner, and extension of time, therefore, will not be granted.
4. Damage caused to utilities either directly or indirectly by the Contractor shall be repaired and the facilities restored to their original condition to the satisfaction of the Engineer and the utility owner, at no additional cost to the Owner.

Work in Vicinity of Existing Utilities

5. At least 48 hours prior to starting work in the vicinity of utility structures and appurtenances, the Contractor shall notify "Miss Utility" as stated hereinbefore. The Contractor, at his own expense, shall support and protect all utility structures and appurtenances in accordance with the Contract Documents and/or the Owner's requirements and shall take any other steps necessary to protect the structures from disturbance and damage.

Access to Utilities Facilities

6. The Contractor shall at all times permit free and clear access to the various affected facilities by personnel of the utility for the purpose of inspection, maintenance, providing additional service requirements and the construction of new facilities. When personnel of the utility are working within the limits of work to be performed by the Contractor, the contractor will not be relieved of his responsibility for the maintenance and protection of such facilities.

When local codes or laws require notification of work to agencies or departments, the Contractor shall be responsible for providing such notification.

END OF SECTION

SECTION 1200 PROJECT MEETINGS

1. GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor participation in preconstruction conferences.
- B. Contractor administration of progress meetings and pre-installation conferences.

1.02 PRECONSTRUCTION CONFERENCES

- A. Engineer will administer preconstruction conference for execution of Owner-Contractor Agreement and exchange of preliminary submittals.
- B. Attendance: Owner, Engineer, Contractor, major Subcontractors, representatives of Quality Control firm(s).

1.03 PROGRESS MEETINGS

- A. Contractor shall schedule and administer project meetings throughout progress of the work at maximum monthly intervals, as well as administer called meetings, and pre-installation conferences.
- B. Contractor shall make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within seven (7) days to Engineer, participants, and those affected by decisions made at meetings.
- C. Attendance: Contractor's Superintendent, Contractor's Project Manager, major Subcontractors and Suppliers; Owner and Engineer as appropriate to agenda topics for each meeting.
- D. Suggested Agenda: Review of Work progress, status of progress schedule and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

1.04 PRE-INSTALLATION CONFERENCES

- A. When required in individual specification Section, Contractor shall convene a pre-installation conference prior to commencing work of that Section.
- B. Require attendance of entities directly affecting, or affected by, work of the Section.
- C. Review conditions of installation, preparation and installation procedures, and coordination with related work.

END OF SECTION

SECTION 01300 SUBMITTALS

1. GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Procedures
- B. Schedule of Submittals
- C. Construction Progress Schedules
- D. Schedule of Values
- E. Shop Drawings
- F. Product Data
- G. Manufacturer's Instructions
- H. Operation & Maintenance Manuals

1.02 PROCEDURES

- A. Contractor is required to provide submittals for all materials and equipment furnished and installed under this contract.
- B. Contractor shall deliver submittals to Engineer.
- C. Transmit each item with Submittal cover attached.
 - 1. Number submittals by specification section and revision number (e.g. 01300-1 for initial submission of schedule of submittals.)
 - 2. Submit only one item per cover. Highlight all deviations from the Contract Documents, and provide explanation/justification for deviation.
 - 3. Complete all portions of the form above the Contractor's signature line. Incomplete submittals or submittals with unhighlighted deviations will be returned unreviewed.
- D. Submit initial progress schedules, schedule of values, and schedule of submittals in duplicate within 15 days after date of Owner-Contractor Agreement. After review by Engineer revise and resubmit as required. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.
- E. Comply with progress schedule for shop drawings, product data, and manufacturer's instructions related to Work progress, and coordinate submittal of related items.
- F. Allow a minimum of two weeks' review time.
- G. Distribute copies of reviewed submittals to appropriate parties. Instruct recipients to promptly report any inability to comply with provisions.

1.03 SCHEDULE OF SUBMITTALS

- A. Contractor to provide to Engineer a Schedule of Submittals for all products used during construction 2 weeks prior to the start of work.
- B. Submit the number of copies required by the Contractor, plus three for the Engineer to retain.

SECTION 01300 SUBMITALS

1.04 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit horizontal bar chart with separate bar for each major trade or operation, identifying first work day of each week. Show relationships between critical path items and indicate lead times for equipment and materials delivery, etc.
- B. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Show projected percentage of completion for each item of Work as of time of each Application for Progress Payment.
- C. Construction schedule shall consider the following typical number of weather days, (i.e. > 0.10" of precipitation) as well as days following during which site conditions may impede progress of the work. The Contractor will not be allowed a time extension due to inclement weather conditions if the total number of inclement weather days for the duration of the project is less than the total inclement weather days indicated below.

<u>J</u>	<u>F</u>	<u>M</u>	<u>A</u>	<u>M</u>	<u>J</u>	<u>J</u>	<u>A</u>	<u>S</u>	<u>O</u>	<u>N</u>	<u>D</u>
<u>6</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>5</u>

- D. Submit the number of copies required by the Contractor, plus three for the Engineer to retain.
- E. Determination of actual rain days will be based on data published by NOAA for the gauging station nearest the project site, which will be identified at the pre-construction meeting.
- F. At each monthly progress meeting, prepare a Monthly Project Summary Report (form included with this section) and attach to the revised project schedule.

1.05 SCHEDULE OF VALUES

- A. A schedule of values based on the contractor's lump sum price shall be typed on 8-1/2 x 11 inch paper.
- B. Items of work shall be broken down into separate values for materials and labor.
- C. Breakdown shall be detailed sufficiently to be able to properly identify work value completed at the end of each month's progress. It shall include as a minimum, the following:
 - 1. Submit Schedule of Values in bar chart format
 - 2. List each item separately, to include E & S Controls
 - 3. Indicate start and finish dates
 - 4. List all critical path items
- D. Submit the number of copies required by the Contractor, plus three for the Engineer to retain.

1.06 SHOP DRAWINGS

- A. Submit the number of copies required by the Contractor, plus three for the Engineer to retain.

SECTION 01300 SUBMITALS

1.07 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturer's standard data to provide information unique to the Work.
- B. Submit the number of copies required by the Contractor, plus three for the Engineer to retain.

1.08 MANUFACTURER'S INSTRUCTIONS

- A. Submit manufacturer's printed instructions for delivery, storage, assembly, installation adjusting, and finishing.
- B. Submit the number of copies required by the Contractor, plus three for the Engineer to retain.

2. PRODUCTS – NOT USED

3. EXECUTION

3.01 Shopdrawings and Submittals

- A. Contractor shall keep a copy of all shop drawings and submittals on the project site for the duration of the contract.

END OF SECTION

(See Monthly Project Summary Report which follows)
(See Submittal Cover which follows)

**SECTION 01300
SUBMITALS**

MONTHLY PROJECT SUMMARY REPORT

MEETING DATE: _____

Is the project on Schedule? _____ Yes _____ No

Number of weeks AHEAD of Schedule _____

Number of weeks BEHIND Schedule _____

List items from Schedule which are **AHEAD OF SCHEDULE**:

List items from Schedule which are **RIGHT ON SCHEDULE**:

List items from Schedule which are **BEHIND SCHEDULE**:

If behind, what is the Contractor doing to get back on schedule?

When does the Contractor anticipate the Project to be back on Schedule? Date: _____

Are there any outstanding change order items? _____ Yes _____ No

If so, list them:

Adverse Weather Summary

	<u>J</u>	<u>F</u>	<u>M</u>	<u>A</u>	<u>M</u>	<u>J</u>	<u>J</u>	<u>A</u>	<u>S</u>	<u>O</u>	<u>N</u>	<u>D</u>
Scheduled	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Actual	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Balance	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

SUBMITTED: _____

DATE: _____

SIGNED: _____

TITLE: _____

**SECTION 01300
SUBMITTALS**

Submittal Cover

No. _____ - _____

Project:

Project #:

To: Timmons Group
Attn: Ken Turner
2901 South Lynnhaven Road, Suite 200
Virginia Beach, Virginia 23452

From:

Date Submitted:

Review Requested Not Later Than:

Submittal Information and Contractor's Representation

Subject: _____

Pursuant to Specification Section(s): _____ Drawing No(s). _____

Submitted as: ☐ Specified Item ☐ "Equal" Item ☐ Substitution ☐ _____

Items Submitted: _____

The Contractor's submittal of items for the Engineer's review and approval constitutes a representation that the items proposed have been reviewed thoroughly by the Contractor and found to be in conformance with the requirements of the Contract Drawings and Specifications. All deviations have been clearly listed in the submittal package and an explanation provided for the deviation.

Contractor's Reviewer (sign): _____

Date: _____

Review Information

Timmons Group:

Received on: _____ Forwarded for review to: _____

Reviewer:

Received On: _____ Reviewed by: _____

Review is for general compliance with the Contract Documents. Nothing in this review shall be taken as permitting variation from the Contract Documents, unless specifically stated by the reviewer in writing. Sole responsibility for correctness of dimensions, options, details, quantities, and safety during fabrication and erection shall remain with the Contractor. EVALUATION OF INSTALLATION FOR FINAL ACCEPTANCE WILL BE BASED ON THE CONTRACT DOCUMENTS, NOT THE SUBMITTALS, EXCEPT AS SPECIFICALLY APPROVED OTHERWISE IN WRITING.

☐ No Exceptions Taken ☐ Rejected ☐ Resubmission Not Required
☐ Revise and Resubmit ☐ Submit Specified Item ☐ _____

Comments: _____

SECTION 01300
SUBMITALS

Returned to Timmons Group:

Returned to Contractor:

SECTION 01400 TESTING & INSPECTION

1. GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Electrical Testing and Inspection
- B. Mechanical Testing and Inspection

1.02 Electrical Testing and Inspection

- A. The Contractor will obtain all necessary building and electrical permits required to complete the work in accordance with applicable codes and regulations. Electrical inspections shall be scheduled by the contractor to insure all electric code requirements are met. The owner's representative shall be made aware of all electrical inspections and given an opportunity to inspect the work before improvements are placed into service.

1.03 Mechanical Testing and Inspection

- A. The Contractor will obtain all necessary building and mechanical permits required to complete the work in accordance with applicable codes and regulations. Mechanical inspections shall be scheduled by the contractor to insure all mechanical code requirements are met. The owner's representative shall be made aware of all mechanical inspections and given an opportunity to inspect work before it is placed into service.

1.04 Not Used

1.05 Inspection and Testing

- A. Inspection
 - 1. The Engineer has the right to inspect all material and equipment at all stages of development or fabrication, and shall be allowed access to the site and to the Contractor's and Supplier's shops to conduct such inspection. Inspection by the Engineer will not release the Contractor from responsibility or liability with respect to material or equipment.
 - 2. When specified inspections or tests are required by the Contract Documents, the work involved shall not proceed beyond that point until such inspections or tests have been approved by the Inspection agency. The Contractor shall inform the Inspection Agency of progress of the work and shall give the Inspection Agency a minimum of three working days written notice of appropriate times for specified inspections and tests. The Contractor shall insure that the portion of work to be inspected is safe, accessible, dry, ventilated, and well lit.
 - 3. When local codes or laws require approval and inspection of the work by other agencies or organizations before installation or operation, the Contractor shall obtain such approval and submit one signed original and three copies of the approval to the Inspection Agency.
 - 4. That portion of the work subject to the provisions of the Virginia Uniform Statewide Building Code shall be constructed in accordance with the latest version.
 - 5. Work shall be subjected to continuous inspection and two formal inspections: Preliminary and Final. Each formal inspection shall be scheduled at a time approved by the Inspection Agency and shall be performed by the Contractor in the presence of the

SECTION 01400

TESTING & INSPECTION

Inspection Agency. All required labor, materials, equipment, instruments, lubricants and incidentals necessary to perform these inspections shall be furnished by the Contractor. This includes providing competent and experienced personnel, who are authorized representatives of the manufacturers of the equipment furnished, to assist the Contractor in the installation, testing, and adjustments of the equipment to perform in accordance with the Contract Documents. Before proceeding to the next inspection, all discrepancies and deficiencies observed during each inspection shall be noted and corrected and, if directed by the Inspection Agency, the inspection shall be rescheduled and re-performed at no additional cost to the Owner.

- a) Preliminary Inspection: A minimum of 10 days before the final inspection is scheduled, the Contractor with approval of the Inspection Agency shall schedule a Preliminary Inspection to demonstrate that individual components of the work and equipment have been completed in accordance with the Contract Documents, perform required tests, identify deficiencies to be corrected and incomplete Contract items to be completed prior to final inspection. This may require one or a series of preliminary inspections and test procedures for each equipment component included in the Contract. All project record drawings shall be submitted and all Operation and Maintenance Manuals received prior to the Preliminary Inspection.
 - b) Final Inspection: After the Contractor has shown that all systems and project work are completed and deficiencies noted in the Preliminary Inspection are corrected, a Final Inspection of the project including a test and demonstration of all equipment and systems shall be scheduled. This Inspection shall take place a minimum of 20 days before the Contractor's scheduled Substantial Completion date. Correction of the deficiencies noted in the Preliminary Inspection shall be accomplished before the Final Inspection. This Inspection shall demonstrate that all elements of the project are ready to be placed in operation and all work has been substantially completed in accordance with the Contract Documents. The Inspecting Agency and Engineer will prepare a punch list of items to be accomplished prior to Final Acceptance.
- B. Equipment Testing: Test procedures as specified in the Contract Documents or as otherwise required shall be coordinated and demonstrated during the Preliminary and Final Inspections. Each test shall be scheduled and performed by the Contractor in the presence of the Inspecting Agency. All required labor, materials, equipment, instruments, lubricants, and incidentals to perform the tests shall be furnished by the Contractor. This shall include providing competent and experienced personnel, who are authorized representatives of the manufacturers of the equipment furnished, to assist the Contractor in the installation, testing, and adjustments of the equipment to perform in accordance with the Contract Documents. Before proceeding to the next test, all discrepancies and deficiencies observed during each test shall be noted and corrected and, if directed by the Inspecting Agency, the test rescheduled and re-performed at no additional cost to the Owner.
- 1. Preliminary Tests: During the Preliminary Inspection, equipment shall be operated and required test procedures performed to demonstrate that individual units of equipment have been completed and function in accordance with the Contract Documents and to identify deficiencies and items of work, which are not complete. Required modifications and adjustments determined during each test shall be completed prior to the Final Inspection.

SECTION 01400
TESTING & INSPECTION

2. Final Test: After all equipment and systems have passed the Preliminary Inspection and are completely installed with controls, instrumentation, safety devices and all items of work completed including correction of deficiencies, and adjustments, the Final Inspection and Test shall be scheduled. This Test shall consist of continuously operating the equipment and systems without interruption under actual operating conditions to demonstrate that all are fully operative and ready to be permanently placed in operation. The contractor shall work with the owner during the startup period to ensure all systems work correctly.

2. PRODUCTS - NOT USED

3. EXECUTION - NOT USED

END OF SECTION

SECTION 01730 OPERATING & MAINTANENCE DATA

1. GENERAL

1.01 Requirements

- A. Operation and Maintenance manuals are required for all materials and equipment provided and installed in the project.
- B. Two preliminary copies of each manual shall be submitted to Engineer prior to the date of shipment of the equipment. After review and approval by Engineer, four final copies of each operation and maintenance manual shall be prepared and delivered to Engineer not later than 30 days prior to placing the equipment in operation. Copies supplied to Engineer are in addition to those required by the Contractor. Preliminary and final manuals, and all other parts lists and information, shall be bound in a loose-leaf type manual properly indexed and bound in hard back, three-ring binder(s) with covers and spines bearing suitable identification. A table of contents and index tabs shall be furnished for all volumes containing data for three or more items of equipment. All material shall be marked with Project identification.
- C. Operation and Maintenance shall contain complete operation and maintenance instructions including but not limited to the following:
 - 1. Equipment warranties;
 - 2. Operating and maintenance data;
 - 3. Troubleshooting information and procedures;
 - 4. Lubrication information and schedules;
 - 5. Nameplate data, model numbers and serial numbers for all equipment and motors;
 - 6. Assembly drawings with part numbers;
 - 7. Approved shop drawings, plan elevation and section drawings showing all details as equipment has been installed.
 - 8. All appurtenances provided with equipment including valves, fittings, supports and brackets;
 - 9. All electrical components, control panels, switches, floats, electronic components, relays, sensors, starters, contactors and enclosures;
 - 10. Names, telephone numbers, and addresses of applicable subcontractors, equipment and service suppliers and manufacturers; and,
 - 11. Any other information concerning operation or maintenance of equipment readily available to Contractor and as required to repair and order parts.

2. PRODUCTS NOT USED

3. EXECUTION

- A. Information included in the O & M Manual shall be specific to the equipment or item installed. Data sheets that include information not pertinent to the specific equipment or product should be omitted. Where data sheets have multiple information all non pertinent

SECTION 01730
OPERATING & MAINTANENCE DATA

information shall be edited out and pertinent information shall be highlighted to make it clear which information applies.

- B. Drawings shall be provided which clearly indicate the item and the installation. These should include plan views, elevation views and section views as required. Drawings should be scaled and dimensioned. Drawings from the approved submittals should be included and corrected if required to indicate the “as-built” condition.
- C. Information shall include name plate data, serial numbers, order numbers, dates, contact information and other pertinent information that are required to trace a piece of equipment back to the manufacturer.

END OF SECTION

SECTION 01740
STARTUP, TRAINING, WARRANTIES, & GUARANTEES

1. GENERAL

1.01 Startup Services

- A. Contractor shall provide startup services for all equipment and systems as required. Contractor shall demonstrate running of all systems and equipment together as a unit. Contractor shall provide all labor and materials, manufacturers' representatives, field service technicians and coordination between all parties as required. This shall include coordination between equipment from different suppliers. All startup services shall be coordinated with the owner or engineer and a representative of either shall be present.
- B. Contractor shall include manufacturer's training for all equipment. Training time duration shall be as reasonable required for the complexity of the equipment and shall be in accordance with the manufacturer's recommendations. Training times and requirements are usually specified in each equipment section in these specifications; however, if they are not specifically mentioned the contractor is still required to include training.
- C. Owner may, at his option, choose to video tape training.

1.02 Tie-ins and Operation of Owner's Equipment

- A. Contractor shall not make any tie-ins to existing systems whether in service or not without pre-approval from the owner and without an owner's representative present.

1.03 Warranty's and Guarantees

- A. Contractor shall provide Warranty's and Guarantees on all materials, equipment, workmanship, installations, labor and operation items provided and /or installed by the Contractor or any of its subcontractors and /or suppliers.
- B. Warranty's and Guarantees shall be for a period of one year after:
 - 1. Once accepted by the owner before substantial completion of the project.
 - 2. Date of substantial completion of the project.
 - 3. Being installed after substantial completion of the project.
 - 4. Equipment installed does not constitute being "in service".

1.04 Storage

- A. Contractor shall store all materials and equipment in accordance with all manufacturers' recommendations. Contractor shall include in his submittal package the manufacturers' recommended long term and short term storage procedures. Storage procedures shall extend to equipment installed but not put into service and shall continue until project completion.

2. PRODUCTS - NOT USED

3. EXECUTION

- 3.01 All equipment shall be inspected by the manufacturer or his representative after installation and the manufacturer or his representative shall supervise the equipment

SECTION 01740
STARTUP, TRAINING, WARRANTIES, & GUARANTEES

startup. Contractor shall provide a written document from the manufacturer of all equipment installed and/or provided by the contractor that their equipment has been installed correctly and all warranty's and guarantees are in effect.

- 3.02 Startup shall be performed under typical service operating conditions.
- 3.03 Written documentation shall contain various check off items as recommended by the manufacturer and include but not be limited to:
 - A. Correct operating head
 - B. Correct supports
- 3.04 In the event one or more components fail to perform as specified or is proven defective in service during the guarantee period, the Contractor shall provide replacement parts and labor to make all repairs without cost to the Owner.
- 3.05 The warranty shall not cover any item that has been subjected to external damage, disassembled and/or repaired by unauthorized persons, or otherwise mistreated.

END OF SECTION

SECTION 02220
SITE DEMOLITION

1. GENERAL

1.01 RELATED DOCUMENTS

- A. The Plans general provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK

- A. Site demolition work is described in a general nature on the Drawings - exact extent of the site demolition may not be fully indicated. Determine the nature and extent of site demolition that will be necessary by comparing the Contract Documents with existing conditions. Perform all work of a demolition nature that may be required or necessary to provide a full completion of the Work, whether or not shown or specified.
- B. Except as permitted in writing by the Owner, do not interrupt existing utilities serving facilities occupied and used by the Owner or others, nor disrupt the Owner's operations at adjacent facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction (including fire authorities). Protect existing utilities, site improvements, appurtenances, and landscaping to remain.
- C. Before start of work, obtain and pay for all permits required by authorities having jurisdiction. All work shall comply with Federal, State and Local laws and regulations concerning hauling and disposal of demolition debris.
- D. Notify and coordinate demolition with all involved utility companies.
- E. Exact extent of the site demolition may not be fully indicated on the plans. Determine the nature and extent of site demolition that will be necessary by comparing the Contract Documents with existing conditions. Perform all work of a demolition nature that may be required or necessary to a full completion of the Work, whether or not shown or specified. Access to site must be coordinated with Owner.
- F. Demolition includes removal of all existing site improvements that interfere with new construction, and disposal of demolished materials from the site unless instructed otherwise by the Owner.
- G. Provide an orderly sequence of demolition and removal to ensure the uninterrupted progress of operations.

1.03 JOB CONDITIONS

- A. Conditions of Site Improvements: The Owner assumes no responsibility for the actual condition of site improvements to be demolished.
 - 1. The Owner will maintain conditions existing at the time of inspection for bidding purposes in so far as practicable.
 - 2. Contractor shall be responsible for contacting the Owner to schedule a site inspection of the facility to be demolished prior to bidding.
- B. Damage: Promptly repair damage caused to adjacent facilities by demolition operations to the satisfaction of the Owner.

SECTION 02220
SITE DEMOLITION

- C. Contractor shall include in his base bid, but not limited to, the following items:
 - 1. Removal and disposal of all below grade structures associated with the completion of this project, if necessary.

1.04 SUBMITTALS

- A. Identify and accurately depict capped utilities and other subsurface structural, electrical, or mechanical conditions on Record Drawings.

1.05 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from the site.
- B. Storage or sale of removed items or materials on-site will not be permitted.
- C. Historical items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner, which may be encountered, remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

1.06 SALVAGE DEPOSITION, STORAGE AND HANDLING

- A. All equipment as designated by the Owner shall be turned over to it's owner (whether the City or other entity as directed by the Owner) at a location specified by the Owner.
- B. Salvage items, designated for salvage, as a unit. Clean, list, and tag those items for storage. Protect from damage and deliver to location designated. Salvage each item with auxiliary or associated equipment required for operation.
- C. Dispose of items or materials not designated for salvage or reuse. Promptly remove from site. Do not store or sell Contractor salvaged items or materials on site.

1.07 JOB CONDITIONS

- A. Perform preliminary investigations as required to ascertain extent of work. Conditions that would be apparent by such investigation will not be allowed as cause for claims for extra costs.
- B. Before start of work, obtain and pay for all permits required by all authorities having jurisdiction and notify all involved utility companies.
- C. Obtain approval of authorities having jurisdiction for any work that affects access to or exit from such areas. Obtain approval of authorities for any temporary construction that affects such areas.

2. PRODUCTS - NOT USED

3. EXECUTION

3.01 SALVAGE, STORAGE AND HANDLING

- A. Prior to beginning demolition, inventory and record the condition of items to be removed and salvaged and turned over to the Owner.

**SECTION 02220
SITE DEMOLITION**

- B. Salvage items designated by the Owner for salvage.
 - 1. Clean, list, and tag those items for storage. Protect from damage and deliver to the Owner at a location designated by the Owner. Salvage each item with auxiliary or associated equipment required for operation.
- 3.02 DEMOLITION
 - A. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.
- 3.03 DISPOSAL OF DEMOLISHED MATERIALS
 - A. Transport materials removed from demolished structures weekly, weather permitting, and legally dispose of off the site such as an approved landfill.
 - B. Burning of removed materials from demolished structures will not be permitted.
- 3.04 CLEAN UP
 - A. Remove all debris, rubbish, materials, dirt, and dust resulting from cutting, demolition or patching operations from adjacent areas and structures.
 - B. Promptly repair damage caused to adjacent facilities by demolition operations to the satisfaction of the Owner.

END OF SECTION

SECTION 11301 VERTICAL TURBINE PUMP

1. GENERAL

1.01 SECTION INCLUDES

- A. This specification covers information on the existing propeller pump with above ground discharge. The line shaft bearings are lubricated by the water being pumped and shall remain in service and operable upon completion of the motor replacement. The pumping unit shall remain in place and have a new 125 HP electric motor installed in accordance with the latest Hydraulic Institute and AWWA Standards for propeller pumps.

1.02 REFERENCES

- A. Publications listed below form part of this specification to extent referenced in the text by basic designation only. Consult latest edition of publication unless otherwise noted.
1. American National Std. Institute (ANSI) / American Water Works Assoc. (AWWA)
 - a) ANSI B16.1 Cast iron pipe flanges and flanged fittings.
 - b) ANSI/AWWA C115/A21.51 Cast/ductile iron pipe with threaded flanges.
 - c) ANSI 253.1 Safety Color Code for Marking Physical Hazards.
 - d) ANSI B40.1 Gages, Pressure and Vacuum.
 - e) AWWA C508 Single Swing Check Valves.
 2. American Society for Testing and Materials (ASTM)
 - a) ASTM A48 Gray Iron Castings.
 - b) ASTM A126 Valves, Flanges, and Pipe Fittings.
 - c) ASTM A307 Carbon Steel Bolts and Studs.
 - d) ASTM A36 Structural Steel.
 3. Institute of Electrical and Electronics Engineers (IEEE)
 - a) ANSI/IEEE Std 100 Standard Dictionary of Electrical Terms.
 - b) ANSI/IEEE Std 112 Test Procedure for Polyphase Induction Motors.
 - c) IEEE Std 242 Protection of Industrial and Control Power Systems.
 4. National Electric Code (NEC) / National Electrical Manufacturers Assoc. (NEMA)
 - a) NEC National Electric Code.
 - b) NEC 701 National Electric Code article 701.
 - c) NEMA Std MG1 Motors and Generators.
 5. Miscellaneous References
 - a) Ten-State Standards Recommended Standards for Sewage Works.
 - b) Hydraulic Institute Std for Centrifugal, Rotary and Reciprocating Pumps.
 - c) NMTBA and JIC Std. National Machine Tool Builders Association and Joint Industrial Council Standards
 - d) ISO 9001 International Organization for Standardization.

1.03 SYSTEM DESCRIPTION

The motor shall be the product of, and manufactured by NIDEC MOTOR CORPORATION; Frame 5812P, 125 HP, WP-1 enclosure, vertical HOLLOSHAFT, 14 pole, 514 RPM, 3 phase, 460 V, premium efficiency or engineer approved equal.

1.04 PERFORMANCE CRITERIA

- A. The motor shall be capable of driving a Fairbanks –Morse Pump model 8211GL 36” single stage propeller pump with the following characteristics

SECTION 11301 VERTICAL TURBINE PUMP

1. Capacity (GPM): 30,000 / 33,500
 2. Total Dynamic Head (FT): 13 / 3.5
 3. Minimum pump efficiency: 79 % @30,000
 4. Minimum motor efficiency: 94 %
 5. Maximum allowable speed (RPM): 514
 6. Maximum motor horsepower: 125
 7. Liquid to be pumped: Storm Water
- B. The existing pumps and bearing cooling systems, FARVAL DA-5, 6- feed lubricator with DM-31 valves, shall remain in place and be fully operational after new motors have been installed.
- C. The bolt pattern and frame style of the new motors shall be measured and verified by the contractor prior to submission of shop drawings to insure the new motors can be easily bolted to the existing pump frame.

1.05 SUBMITTALS

A. Product Data

1. Prior to fabrication, motor manufacturer shall submit 5 copies of submittal data for review and approval.
 2. Submittal shall include shop drawings, electrical ladder logic drawings, warranty information, and support data as follows: Catalog cuts sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions, motor and transformer data, efficiency and hydraulic brake horsepower (BHP). Electrical components used in the motor branch and liquid level control shall be fully described.
- B. Shop drawings shall provide layout of mechanical equipment and anchor bolt locations for equipment baseplate. The electrical ladder logic drawings shall illustrate motor branch and liquid level control circuits to extent necessary to validate function and integration of circuits to form a complete working system.
- C. Operations Maintenance Manuals
1. Installation shall be in accordance with written instructions provided by the motor manufacturer. Comprehensive instructions supplied at time of shipment shall enable personnel to properly operate and maintain all equipment supplied. Content and instructions shall assume operating personnel are familiar with pumps, motors, piping and valves, but lack experience on exact equipment supplied.
 2. Documentation shall be specific to the pump supplied and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied by the station manufacturer. Support data for any equipment supplied by others, even if mounted or included in overall station design, shall be provided by those supplying the equipment. Instructions shall include the following as a minimum:
 - a) Functional description of each major component, complete with operating instructions.

SECTION 11301 VERTICAL TURBINE PUMP

3. Operation and maintenance instructions which rely on vendor cut-sheets and literature which include general configurations, or require operating personnel to selectively read portions of the manual shall not be acceptable. Operation and maintenance instructions must be specific to equipment supplied in accordance with these specifications.

1.06 QUALITY ASSURANCE

- A. The manufacturer's technical representative shall inspect the completed installation, correct or supervise the correction of any defect or malfunction, and instruct operating personnel in the proper operation and maintenance of the equipment as described in Part 3 of this section.

1.07 MANUFACTURER'S WARRANTY

- A. The pump manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship for a period of twelve (12) months from the date of acceptance. A written warranty shall be provided with the submittals.
- B. Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer.

2. PRODUCTS

2.01 GENERAL

- A. All equipment shall be explosion proof, Class 1, Division 2 to conform to Article 500 of the NEC.

2.02 ELECTRIC MOTOR

- A. The motor shall be a heavy duty squirrel cage induction type, inverter duty rated, minimum NEMA Class F insulation, 514 RPM vertical hollow shaft motor, with a non-reverse ratchet to prevent reverse rotation of the rotating elements. A thrust bearing of ample capacity to carry the weight of all rotating parts plus the maximum hydraulic thrust load under all conditions of operation shall be provided. The calculated L10 life shall be no less than 8800 hours. Provision shall be made for momentary upthrust equal to 30% of the rated down thrust. The motor shall be premium efficiency, 1.15 service factor, and suitable for use on 480 volt, three phase, 60 Hz electric service.
- B. A bronze adjusting nut shall be provided at the top of the motor for setting the impeller to bowl running clearance and shall be fabricated to less than 0.03" total indicated run out.
- C. Each new motor shall be supplied with a new motor shaft to take into account the difference in the coupling height between the existing and proposed motors. New motor shaft shall be constructed of ASTM 582 type 16 stainless steel. It shall be precision ground and polished with a surface finish better than 40 RMS.

3. EXECUTION

3.01 EXAMINATION

- A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Motor manufacturer shall provide written instruction for proper handling. Immediately after off-loading, contractor shall inspect motor for shipping

SECTION 11301 VERTICAL TURBINE PUMP

damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

3.02 INSTALLATION

- A. Install, level, align, and lubricate motor as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.
- B. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel.
- C. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Start-up Services

- 1. Coordinate start-up with manufacturer's technical representative. The representative or factory service technician will inspect the completed installation. He will calibrate and adjust, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

B. Operational Test

- 1. Prior to acceptance by owner, the contractor shall perform an operational test of each motor and reduced voltage auto transformer by operating the motor and existing pump assembly for a period of 12 hours before a second motor can be removed. During the 12 hour operational test, current and voltage of all phases shall be monitored and recorded and the results presented to the owner for acceptance. Each new motor shall also go through at least 6 start stop iterations to insure proper operation of all controls. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.
- 2. After demonstration of proper operation of a new motor and existing pump combination, the contractor shall be permitted to remove a subsequent motor realizing that at least 2 of the existing pumps shall remain available for service when power is restored for any electrical shut down necessary to install new motor and reduced voltage autotransformer.

3.04 CLEANING

- A. Prior to acceptance, inspect new equipment for dirt, splashed material or damaged paint. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

3.05 PROTECTION

- A. The pump should be placed into service immediately. If operation is delayed, pump is to be stored and maintained per manufacturer's written instructions.

SECTION 11301
VERTICAL TURBINE PUMP

END OF SECTION

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for basic electrical studies and reports, material handling, and other basic electrical materials and methods.
- B. Related Sections:
 - 1. Section 16060 - Grounding and Bonding.
 - 2. Section 16070 - Hangers and Supports.
 - 3. Section 16075 - Electrical Identification.
 - 4. Section 16080 - Electrical Testing.
 - 5. Section 16122 - Low-Voltage Wire, Cable, and Accessories.
 - 6. Section 16131 - Conduit and Fittings.

1.02 REFERENCES

- A. America National Standards Institute (ANSI):
 - 1. ANSI Z535.4, Product Safety Signs and Labels.
- B. Institute of Electrical and Electronic Engineers (IEEE):
 - 1. ANSI/IEEE 18, Standard for Shunt Power Capacitors.
 - 2. ANSI/IEEE 141, Recommended Practice for Electric Power Distribution for Industrial Plants - Red Book.
 - 3. ANSI/IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems - IEEE Buff Book.
 - 4. ANSI/IEEE 399, Recommended Practice for Power Systems Analysis - Brown Book.
 - 5. ANSI/IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
 - 6. ANSI/IEEE 1584, Guide for Arc-Flash Hazard Calculations.
 - 7. ANSI/IEEE C37.10, Guide for Diagnostics and Failure Investigation of Power Circuit Breakers.
 - 8. ANSI/IEEE C37.13, Low-Voltage AC Power Circuit Breakers Used in Enclosures.
- C. InterNational Electrical Testing Association, Inc. (NETA):
 - 1. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
- D. National Electric Manufacturer's Association (NEMA).
 - 1. ANSI/NEMA MG 1, Motors and Generators.
 - 2. NEMA ICS 6, Industrial Control and Systems: Enclosures.
- E. National Electrical Contractors Association (NECA)
 - 1. ANSI/NECA 100 Symbols for Electrical Construction Drawings.

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- F. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code (NEC).
 - 2. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.
- G. Other Published References:
 - 1. Electrical Safety Handbook, by John Cadick, McGraw Hill, Inc., Article on Safety Electrical One-Line Diagrams.

1.03 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Submittal Procedures:
 - 1. Product Data:
 - a. Submit Product Data, including catalog cuts, for all products provided for the electrical work of this Contract and as specified in other Sections.
 - 1) Clearly indicate the usage of each product on each submittal.
 - 2. Shop Drawings:
 - a. Submit Shop Drawings for the electrical work of this Contract as specified in other Sections.
 - 3. Closeout Submittals:
 - a. Operation and Maintenance Manuals per Paragraph 1.07A.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Testing Agency Qualifications:
 - a. Use a NETA accredited testing agency, or approved equal, that is accredited for the region in which the Contract work is performed.
 - b. Submit the testing agency's qualifications to the Engineer for approval.
- B. Regulatory Requirements:
 - 1. Perform all electrical work in conformance with the requirements of NFPA 70, the National Electrical Code.
- C. Certifications:
 - 1. Submit evidence with all Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - a. Such evidence may consist of either a printed mark on the data or a separate listing card.
 - b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the Owner and the Engineer.

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BASIC ELECTRICAL MATERIALS AND METHODS

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and equipment to the work site as follows:
 - 1. Deliver materials and equipment in a clean condition.
 - a. Provide packaging that plugs, caps, or otherwise seals openings both during shipping and temporary storage.
 - 2. Provide equipment needed for unloading operations, and have such equipment on the work site to perform unloading work when the material and equipment is delivered.
 - a. If possible, clearly identify pick-points or lift-points on electrical equipment crating and packaging.
 - b. In the absence pick-points or lift-points on equipment crating and packaging, identify pick-points or lift-points on the equipment itself.
- B. Handle materials and equipment as follows:
 - 1. Handle materials and equipment in accordance with manufacturer's written instructions.
 - 2. When unloading materials and equipment, provide special lifting harnesses or apparatus as required by manufacturers.
- C. Store electrical materials and equipment, whether on-site or off-site, as follows:
 - 1. Follow the manufacturer's written instructions for storing the items.
 - 2. Store electrical equipment and products under cover.
 - a. Except for electrical conduit, store electrical equipment and products in heated warehouses or enclosed buildings with auxiliary heat and that provide protection from the weather on all sides.

1.06 SYSTEM STARTUP

- A. Energize the following items in the presence of the Engineer:
 - 1. VFD control panel
 - 2. Equipment rated over 208 Volts
 - 3. Exhaust Fans
- B. Startup the following items in the presence of the Engineer:
 - 1. VFD control panel
 - 2. Exhaust Fans
 - 3. Pumping equipment

1.07 O&M MANUALS

- A. Operation and Maintenance Manuals:
 - 1. Prepare Operation and Maintenance Manuals in conformance with Contract requirements, and as follows:
 - a. Organize Operation and Maintenance Manuals by Specification Section and equipment number as designated on the Contract Drawings.

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BASIC ELECTRICAL MATERIALS AND METHODS

- b. Include suppliers, supplier addresses, and supplier telephone numbers for the equipment and products furnished.
2. 60 days prior to the request for final payment, prepare and submit two copies of the proposed Operation and Maintenance Manuals to the Engineer for approval.
3. Upon approval of the proposed Operation and Maintenance Manuals, submit six corrected copies as follows:
 - a. Submit one set to the Engineer.
 - b. Place one set in the new building
 - c. Deliver the remaining four copies to the Owner.
4. Insert final record drawings in each set of Operation and Maintenance Manuals at Project Closeout.
5. Insert all wiring and schematic as-built diagrams.
6. Insert documentation of all warranties, extended warranties, service agreements, etc.
7. Insert all test reports.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Grounding and Bonding Materials:
 1. Provide grounding and bonding materials in accordance with the requirements of Section 16060.
- B. Hangers and Supports:
 1. Provide hangers and supports for electrical equipment in accordance with the requirements of Section 16070.
- C. Electrical Identification Materials:
 1. Provide electrical identification materials in accordance with the requirements of Section 16075.
- D. Wire and Cable:
 1. Provide low-voltage electrical wire, cable, and accessories in accordance with the requirements of Section 16122.
- E. Conduit:
 1. Provide conduit as indicated, as appropriate for the application per NFPA 70, and in accordance with the following:
 - a. Conduit and Tubing: Provide electrical conduit and tubing in accordance with the requirements of Section 16131.

2.02 SHOP FINISHING

- A. For electrical equipment, factory-apply paint and coating systems that at a minimum meet the requirements of the NEMA ICS 6 corrosion-resistance test and the additional requirements specified in individual Specification Sections.

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 3 EXECUTION

3.01 SCHEDULE OF WORK

- A. The schedule of the electrical work shall be arranged to suit the progress of the overall work.
- B. Cutting and patching shall be done in an approved manner. Cutting shall not endanger structural function of the building. Patching shall exactly match contiguous work. Costs of such cutting and patching shall be borne by the Electrical Subcontractor. Cutting shall be carefully done and damage to building, piping, wiring or equipment as a result of cutting shall be repaired by skilled mechanics of trade involved. Cutting of masonry block and brick shall be done with masonry saw.

3.02 STORAGE OF MATERIALS

- A. Space will be assigned to the Contractor by the Owner for the storage of materials. This Contractor will be responsible for the protection and safekeeping of it. All materials and equipment shall be kept in its assigned place until the time of its installation. Excess materials, dirt and refuse shall be promptly removed from the work site.

3.03 LABELING OF EQUIPMENT

- A. All motor disconnect switches, exhaust fans, VFD control panel, etc., shall be identified by machine engraved laminated plastic designation plates permanently attached thereto. All component parts of each item of equipment or device shall bear the manufacturer's nameplate, giving name of manufacturer, description, size, type, serial and model number, and electrical characteristics in order to facilitate maintenance or replacement. The nameplate of a subcontractor or distributor will not be acceptable.

3.04 OTHER TRADES

- A. Paint all exposed conduit as well as cabinets and related items, etc. not supplied with a factory finish. Color as selected by Owner. Touch up all factory finishes damaged during installation or by adjacent construction work.
- B. If the factory finish of factory-finished items is damaged for any reason, refinish the item.
 - 1. If an item that has several surfaces has damage on one surface, refinish the entire damaged surface.
 - a. Surface Preparation:
 - 1) Outside the damaged area, lightly sand the entire surface and perform additional sanding to profile the damaged paint edge.

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BASIC ELECTRICAL MATERIALS AND METHODS

- 2) Prepare the surfaces of damaged areas in accordance with SSPC-SP 2.

3.05 EQUIPMENT CONNECTIONS AND SERVICES

- A. Disconnect switches and power wiring up to and including motor connections for all equipment provided under other Divisions of this specification shall be included in this Division unless specifically accepted.
- B. No conduit, VFD control panel, conduit stub-up, disconnect switches, etc. shall be installed until exact location has been determined by the coordinated effort of all Subcontractors concerned. Any relocating of equipment, etc., or cutting or patching, which becomes necessary due to improper coordination between trades, shall be done at this Contractor's expense.
- C. Determine electrical requirements of the Contract Drawings and other Divisions in order to fully understand wiring, and provide as required for complete and satisfactory operation of project. Make connections for other Divisions where indicated.
- B. Obtain approved shop drawings showing wiring diagrams, connection diagrams, roughing-in and hook-up details, for all equipment and comply therewith.

3.06 RECORD DRAWINGS (AS-BUILTS)

- A. The Contractor shall maintain and deliver Record Drawings in accordance with the requirements of the General Provisions.
- C. The Contractor shall maintain at the job site one set of blue line or black line prints of the drawings approved by the Owner. The Contractor shall record thereon all changes in the location, sizing, and arrangement that may be made for any reason in the work during the course of construction including Addenda and Change Orders work so as to reflect the installation "as-built". Upon completion of the project, "as-built" drawings shall be prepared and submitted to the Owner in accordance with the requirements of the General Provisions.

3.07 FINAL SITE VISITATION

When the work on the entire project has been completed and is ready for final review, a visit will be made by the Owner or his duly authorized representative, at which time the Contractor shall demonstrate that the requirements of the Contract have been carried out and that the system has been adjusted and operates in accordance therewith.

3.08 GUARANTEE

Contractor shall warrant and guarantee all work in accordance with the General Provisions and as may be further specified herein.

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BASIC ELECTRICAL MATERIALS AND METHODS

3.09 FIELD QUALITY CONTROL

- A. Perform electrical testing as detailed in Section 16080 and in each Specification Section.
- B. Have electrical work inspected as required by the local Authority Having Jurisdiction (AHJ).
 - 1. Submit a copy of the certification of inspection with the final project closeout documents, and post the original in the electrical room on-site protected by a metal frame with a protective plate glass cover.
- C. The quality of finishing and refinishing work is subject to approval by the Engineer

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for connecting, energizing, testing, cleaning, and protecting grounding and bonding systems.
- B. Related Sections:
 - 1. Section 16050 - Basic Materials and Methods.
 - 2. Section 16080 - Electrical Testing.
 - 3. Section 16131 - Conduit and Fittings.

1.02 REFERENCES

- A. American Public Works Association (APWA):
 - 1. APWA Public Works Management Practices Manual.
- B. American Society for Testing Materials (ASTM):
 - 1. ASTM B 1; Standard Specification for Hard-Drawn Copper Wire.
 - 2. ASTM B 8; Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - 3. ASTM C 653; Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation.
 - 4. ASTM D 5; Standard Test Method for Penetration of Bituminous Materials.
 - 5. ASTM D 149; Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
 - 6. ASTM D 257; Standard Test Methods for D-C Resistance or Conductance of Insulating Materials.
 - 7. ASTM D 570; Standard Test Method for Water Absorption of Plastics.
- C. InterNational Electrical Testing Association, Inc. (NETA):
 - 1. ANSI/NETA ETT Standard for Certification of Electrical Testing Technicians.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code (NEC).
- E. National Electrical Manufacturing Association (NEMA):
 - 1. NEMA TC-2; Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 2. NEMA TC-3; Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - 3. NEMA TC-14; Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 - 4. NEMA WC-7; Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

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- F. Underwriter's Laboratories, Inc. (UL):
 - 1. UL 467, Standard for Grounding and Bonding Equipment.
 - 2. UL 486A-486B, Wire Connectors.
 - 3. UL 486C, Standard for Splicing Wire Connections.
 - 4. UL 486D, Standard for Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
 - 5. UL 486E, Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.

1.03 DESIGN REQUIREMENTS

- A. Design the electrical system installation to conform to Article 300 of NFPA 70, Wiring Methods, and to other applicable articles of NFPA 70 governing methods of wiring.
- B. Ground the conduit systems, metal enclosures, equipment frames, and motors, in accordance with Article 250 of NFPA 70, Grounding.
 - 1. Ground all metallic conduits continuously to cabinets, junction boxes, or pull boxes.
 - a. Bond each run of raceways to form a continuous path for ground faults from end to end.
 - b. When liquid tight flexible metal conduit sizes larger than 1-inch or flexible metal conduit are installed, provide external bond wires.
 - 2. Grounding Bushings:
 - a. Provide all 1-inch or larger metallic conduits with grounding bushings unless they enter metallic enclosures via integral threaded hubs.
 - b. Provide grounding bushings for conduits entering the bottom of freestanding equipment.
 - c. Bond wire from every grounding bushing to the equipment ground stud or ground bus in the enclosure.
 - d. Bond the grounding bushings to ground studs or ground buses in the enclosures.
 - 3. Provide insulated, Type XHHW internal equipment ground wire in all conduits.
 - a. Bond the internal wire to all pullboxes, junction boxes, equipment enclosures, and other enclosures as required by NFPA 70.
- C. Equipment Grounds:
 - 1. Design all feeders and branch circuits to include an equipment grounding conductor consisting of a copper wire within a raceway or cable and sized as specified herein.
 - a. Where conductors are run in parallel in multiple raceways, run the equipment grounding conductor in parallel to the related conductors.
 - b. Size each of the parallel equipment grounding conductors on the basis of the ampere rating of the circuit overcurrent protecting device.

SECTION 16060 GROUNDING AND BONDING

2. Ground enclosing cases, mounting frames, rack mounted components, rack struts, switches, breakers, control panels, motors, and other electrical or electrically operated equipment by providing an equipment grounding conductor with phase conductors from an established equipment ground source.

D. Ground Wire Sizes:

1. The minimum size for bonding jumpers, equipment ground conductors, grounding electrode conductors, and ground grid conductors is as follows:
 - a. Under 600 volts:
 - 1) Provide #12 AWG, minimum.
 - 2) Control power circuits, Provide #14 AWG, minimum.
2. When the ground wire size is not specified or indicated on the Contract Drawings, provide wire sized in accordance with the requirements of NFPA 70.

E. Within 60 days of the Contract award, submit the following:

1. The Submittals required by Section 16050.
 - a. Include Product Data and Catalog Cuts for all products provided, and describe the usage of each product.

F. Project Closeout:

1. Submit Operation and Maintenance Manuals that include the record drawings and all Product Data in accordance with Specifications.

1.04 SUBMITTALS

A. Submit the following information for approval in accordance with the requirements for Submittal Procedures:

1. Product Data:
 - a. Manufacturer's product data
2. Quality Assurance/Quality Control Submittals:
 - a. Certificates:
 - 1) Testing agency product certification
 - b. Qualification Statements:
 - 1) System installers' qualifications
 - 2) Installation supervisors' resumes
3. Closeout Submittals:
 - a. Operation and Maintenance Manuals

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
 - a. Employ installers who specialize in the work of this Section, and who can demonstrate a minimum of three years documented experience.
 - b. Submit the system installers' qualifications.
2. Supervisor's Qualifications:

SECTION 16060 GROUNDING AND BONDING

- a. Employ supervisor to supervise the installation work who are skilled licensed electricians.
 - b. Submit the installation supervisors' resumes.
- 3. All products are to be certified by Underwriters Laboratories, Inc. (UL),
- B. Regulatory Requirements:
 - 1. All grounding and bonding Work must comply with the requirements of NFPA 70, the National Electrical Code.
- C. Certifications:
 - 1. Testing Agency Product Certification:
 - a. Verify product quality by certifying products as meeting the requirements of one of the following:
 - 1) Underwriters Laboratories, Inc. (UL).
 - a) Provide products listed and labeled by UL.
 - b. Testing agency product certification must include agency listing and labeling, either by a printed mark on the data or by a separate listing card.
 - 1) If an item does not have this quality assurance verification, provide a written statement from the product manufacturer indicating why not; such manufacturer's statements are subject to the approval of the Owner and the Engineer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Transport materials, both on site and from Contractor's storage to site, in accordance with the recommendations of the respective manufacturers.
- B. Storage and Protection:
 - 1. Store materials, both on and off site, in accordance with manufacturer's written instructions.
 - 2. Store products indoors on blocking or pallets.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Conduit and Conduit Fittings:
 - 1. For conduit and conduit fittings that enclose single ground wires without accompanying circuit conductors, provide one of the following:
 - a. Schedule 80, non-metallic conduit and fittings conforming to the requirements of Section 16131 and the conduit additionally conforming to the requirements of NEMA TC-2, and the fittings additionally conforming to the requirements of NEMA TC-3.
 - 2. For other conduit and conduit fittings, provide conduit of the types specified or indicated and that conform to the requirements of Section 16131.

SECTION 16060 GROUNDING AND BONDING

B. Wire:

1. Bare Ground Wire:
 - a. Soft drawn copper, Class A or Class B stranded, meeting the requirements of ASTM B8 for sizes #6 or larger.
 - b. Soft drawn solid copper, meeting the requirements of ASTM B1 for sizes #8 or smaller.
2. Insulated Ground Wire:
 - a. Provide type XHHW insulated Class B copper stranded wire rated for 600 volts that conforms to the requirements of NEMA WC-7, and is green in color.
3. Acceptable Manufacturers:
 - a. Cablec Continental Co.
 - b. SouthWire
 - c. Okonite
 - d. Rome Cable

C. Clamps and Non-Welded Connectors:

1. Provide bronze or brass clamps and connectors that are UL listed for use below grade.
 - a. All bolts and other material must be bronze or brass, plated steel screws are unacceptable.
 - b. Fabricate multi-bolt, solderless compression clamps from high strength electrical bronze, and provide silicon bronze clamping bolts and hardware.
2. Provide bolts, nuts, lock-washers, and similar hardware designed not to damage ground wire.
3. Acceptable manufacturers:
 - a. IlSCO.
 - b. Framatone Connectors Inc. (FCI), Burndy.
 - c. Approved equal.

D. Coating Compound:

1. Provide permanently pliable, moldable, un-backed, black rubber based coating materials for covering or coating grounding clamps and connectors.
2. Coating Physical Properties:
 - a. Solids/Density: 100 percent; 12 pounds per gallon.
 - b. Penetration: Within 90 to 130 when tested in accordance with ASTM D 5.
 - c. Water Absorption: 0.10 percent, maximum, when tested in accordance with ASTM D 570.
 - d. Dielectric Strength: 500 volts/mil when tested in accordance with ASTM D 149.
 - e. Volume Resistivity: 2,000 megohm-inches, or 5,000 megohms-cm, when tested in accordance with ASTM D 257.
 - f. Service Temperature: Minus 40 degrees to 160 degrees Fahrenheit; and having no melting point; flammability or slow burning when tested in accordance with ASTM C 653.

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- g. Chemical Resistance:
 - 1) Resistant to alcohol, water, aqueous hydrochloride, and sodium hydroxide.
 - 2) Dissolved by carbon tetrachloride, naphtha gasoline, mineral spirits, and benzene.
- h. Cohesive/Adhesive: Adheres to metals, concrete, and itself.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Verification of Conditions:
 - 1. The Contract Drawings are generally indicative of the Work, but due to their small scale, it is not possible to indicate some offsets and fittings required nor the minor structural obstructions that may be encountered.
 - a. Perform field measurements to discover offsets and fitting requirements not shown.
 - b. Locate all on-site utilities and other obstructions in the area of construction, and verify that interferences will not occur.

3.02 PREPARATION

- A. Layout electrical work to suit actual field conditions and in accordance with accepted standard practice.

3.03 INSTALLATION

- A. Construct each ground system and connection so it is mechanically secure and electrically continuous.
 - 1. Secure grounds to boxes in such a manner that each system is electrically continuous from the point of service to each outlet.
 - 2. Terminate conduits using double locknuts and bushings.
 - a. Unless a conduit run enters a metallic enclosure via integral threaded hubs, provide the conduit run with two locknuts.
 - 3. Clean paint, grease and such other insulating materials from the contact points of grounds.
- B. Equipment Grounds:
 - 1. Install equipment grounds in spaces accessible to authorized personnel only.
 - 2. Equipment Grounding Connectors:
 - a. Only use approved grounding connectors.
 - 1) Terminate grounds with closed lugs with star washers on both sides and a 1/4-20 bolt and nut, minimum; spade lugs are not allowed.
 - 2) For portable electrical equipment, provide electric cords having an equipment grounding conductor and a NEMA and UL approved cord cap.

SECTION 16060 GROUNDING AND BONDING

- b. Do not install grounding lugs on flanges, mounting screws, or standoffs in switches, distribution boxes, or panels.
 - c. Cover or coat grounding clamps and connectors with coating compound.
- 3. Equipment Grounding Conductors:
 - a. Unless using multi-conductor cable, run equipment grounding conductors inside the same conduit or wiring channel enclosing the power conductors.
 - b. In multi-conductor cable, locate grounding conductor inside the sheath or cable.
 - c. Do not use a system neutral or a current carrying conductor as the equipment grounding conductor.
 - 1) Do not ground the electrical and electronic equipment neutral to chassis, racks, equipment ground conductor, or any non-current carrying conductor on the equipment.
- 4. Grounding Motors:
 - a. Install equipment grounding wire within conduit supplying power to motor.
 - b. Install bonding connectors across the liquid tight flexible conduit supplying motors.
- 5. Grounding and Bonding Pumps:
 - a. Provide a bond from each pump to its motor using a conductor equal in size to the motor circuit equipment grounding conductors.

3.04 FIELD QUALITY CONTROL

- A. Site Testing:
 - 1. Prior to energizing any system, test the resistance to ground for the system in accordance with Section 16080.
- B. Inspection:
 - 1. Prior to completion of the Work of this Section, inspect the items provided for conformity to the Contract Drawings and Specifications.

3.05 PROTECTION

- A. Protect finished insulated wires from being painted.

END OF SECTION

SECTION 16070
HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for furnishing, installing, cleaning, and protecting hanger and support systems for electrical wiring, conduit boxes, and equipment.
- B. Related Section:
 - 1. Section 16050 - Basic Electrical Materials and Methods.

1.02 REFERENCES

- A. American Iron and Steel Institute (AISI):
 - 1. AISI Standard Steels (Handbook).
- B. American Society for Testing Materials (ASTM):
 - 1. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - 3. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 4. ASTM A 576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
- C. American Welding Society (AWS):
 - 1. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- D. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts maximum).
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code (NEC).
- F. Underwriters Laboratory, Inc. (UL):
 - 1. UL 635 - Standard for Insulating Bushings.
 - 2. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.
 - 3. UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.

1.03 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Submittal Procedures, and Section 16050, Basic Electrical Materials and Methods:
 - 1. Product Data:

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- a. Provide product data and catalog cuts for the products provided under this Section.
- 2. Shop Drawings:
 - a. Provide Shop Drawings of hanging supports for conduit.

1.04 QUALITY ASSURANCE

- A. Qualifications;
 - 1. Electrical Testing Agency (ETA) Qualifications:
 - a. Use the Electrical Testing Agency (ETA) qualified as specified in Section 16050, Basic Electrical Materials and Methods.
- B. Certifications:
 - 1. Electrical Testing Laboratory (ETL) Certification:
 - a. Provide products that are listed and labeled by Underwriters Laboratory, Inc. (UL) or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.
 - 2. Manufacturers Certificate of Compliance:
 - a. Submit a manufacturer's Certificate of Compliance certifying that both the galvanizing and the products meet the requirements of the ASTM standards.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packaging, Shipping, Handling, and Unloading:
 - 1. Deliver, store, and handle the hangers and supports in accordance with Section 16050, Basic Electrical Materials and Methods, and as specified herein.
 - 2. Deliver material to Site in the original factory packaging.
- B. Storage and Protection:
 - 1. Shelter and store the components under cover, and supported off the ground and floors on blocking.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Carbon Steel Shapes:
 - 1. Provide shapes of the sizes specified and as indicated on the Contract Drawings:

2.02 MANUFACTURED UNITS

- A. Metal U-Channel Electrical Support Framing Systems and Fittings:
 - 1. Carbon Steel U-Channel Support Framing Systems:

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- a. Provide 1-5/8-inch nominal size U-channel supports fabricated from 12 gauge carbon steel electrolytically galvanized with a zinc-coating thickness commensurate with Service Condition SC 1 (mild) in conformance with the requirements of ASTM B 633.
 - 1) For Type II ASTM B 633 galvanized finishes, fabricate the framing from steel complying with the requirements for Grade 33 specified in ASTM A 1011/A 1011M.
 - 2) For Type III ASTM B 633 galvanized finishes, fabricate the framing from steel complying with the requirements of ASTM A 575, ASTM A 576, ASTM A 635/A 635M, or ASTM A 36/A 36M.
 - b. Where combination members are required, spot-weld the members on 3-inch centers.
 - c. Provide 1-3/8-inch or larger depths, except where supports are mounted directly to walls 13/16-inch or larger depths may be provided.
 - d. Provide metal framing systems and fittings for metal framing systems from a single manufacturer.
 - e. Manufacturers:
 - 1) Unistrut Corporation, Unistrut® Metal Framing System, www.unistrut.com.
 - 2) Thomas & Betts, Kindorf®, <http://elec-cat.tnb.com>.
 - 3) Cooper B-Line®, Inc., www.b-line.com.
- B. Conduit Supports:
- 1. Malleable Iron Conduit Supports:
 - a. Provide one-hole style galvanized malleable iron fasteners with pipe straps similar to those as manufactured by Thomas & Betts.
 - b. Provide support devices consisting of threaded rods, channel supports, and conduit straps/fasteners.
 - 2. Stamped Steel Conduit Supports:
 - a. Provide one-hole style galvanized stamped steel fasteners with pipe straps similar to those as manufactured by Thomas & Betts.
 - b. Provide support devices consisting of threaded rods, channel supports, and conduit straps/fasteners.
 - 3. Special Finishes:
 - a. Where PVC-coated RGS conduits are to be installed, provide 40-mil PVC coated conduit supports including the threaded rods, channel supports, and conduit straps/fasteners.
 - 4. Manufacturers:
 - a. Thomas & Betts, <http://www-public.tnb.com/contractor/docs/superstrut.pdf>.
 - b. Approved equal.
- C. Bolts, Nuts, and Washers:
- 1. For bolts, nuts, and washers smaller than 1/4-inch trade size, provide 316 stainless steel fasteners complying with the requirements of ASTM A 325.

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2. For fastening galvanized components, provide galvanized bolts, nuts, and washers galvanized in accordance with the requirements of ASTM A 153/A 153M.

D. Anchors and Fasteners:

1. Drive (Deep-Pitch) Screws:
 - a. Provide Type 316 stainless steel self-tapping type drive (deep-pitch) screws that comply with the requirements of FF-S-107C(2).
2. Drilled-In Anchors and Fasteners:
 - a. Provide drilled-in anchors and fasteners that comply with the requirements of FF-S-107C(2).
 - b. Masonry Anchors:
 - 1) Provide masonry anchors designed to accept both machine bolts and threaded rods as fasteners.
 - a) Provide SAE J 429 Grade 2 machine bolt fasteners fabricated from AISI Type 316 stainless steel.
 - b) Provide nuts and washers conforming to the requirements of ASTM A 563.
 - 2) Provide masonry anchors consisting of an expansion shield and expander nut contained inside the shield.
 - a) Expander Nuts:
 - (1) Fabricate square expander nuts with their sides tapered inward from the bottom to the top.
 - (2) Design the expander nuts to simultaneously climb the bolt or rod thread and expand the shield as soon as the threaded expander nut reaches and bears against the shield bottom when being tightened.
 - b) Expansion Shields:
 - (1) Provide expansion shield bodies consisting of four legs, the inside of each tapered toward the shield bottom, or nut end.
 - (2) The end of one leg shall be elongated and turned across shield bottom. Outer surface of shield body shall be ribbed for grip-action.
 - 3) Masonry Anchor Material:
 - a) Provide die cast Zamac No. 3 zinc alloy having a 43,000 psi minimum tensile strength.
 - 4) Manufacturers:
 - a) U.S.E. Diamond, Inc., FORWAY System, , www.mktfastening.com.
 - c. Concrete Anchors:
 - 1) Carbon Steel Anchor/Fastener:
 - a) Provide UL listed one-piece studs (bolts) with integral expansion wedges, nuts, and washers.
 - b) Provide carbon steel anchor/fasteners complying with the physical requirements specified in FF-S-325 for Group II, Type 4, Class 1.
 - 2) Stainless Steel Anchor/Fastener:

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- a) Provide one-piece AISI Type 303 or 304 stainless steel studs (bolts) with integral expansion wedges, AISI Type 316 stainless steel nuts, and AISI Type 316 stainless steel washers.
- b) Provide stainless steel anchor/fasteners complying with the physical requirements of FF-S-325 for Group II, Type 4, Class 1.
- 3) Acceptable Manufacturers:
 - a) U.S.E. Diamond, Inc.; SUP-R-STUD, www.mktfastening.com.
 - b) Hilti Fastening Systems; KWIK-BOLT, hilti.com.
 - c) Molly Fastener Group; PARABOLT.
 - d) Phillips; RED HEAD Wedge-Anchor, www.phillipsfastener.com.
- 3. Hammer drive-type explosive charge drive-type anchors and fastener systems are unacceptable.
- 4. Lead shields, plastic-inserts, fiber-inserts, and drilled-in plastic sleeve/nail drive systems are unacceptable.

2.03 ACCESSORIES

- A. Wall Seals:
 - 1. Provide a hydrostatic seal to fill the annular space between conduit and through structure openings.
 - 2. Manufacturer:
 - a. PSI-ThunderLine/Link-Seal Corp., Link-Seal[®], www.linkseal.com.

2.04 FABRICATION

- A. Fit and shop assemble items in the largest sections practical for delivery to the Site.

2.05 FINISHES

- A. Prime paint non-galvanized steel items.
 - 1. Prepare surfaces to be primed in accordance with the requirements of SSPC-SP 2.
 - a. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - 2. Prime Painting: Apply one coat of primer.
- B. Galvanizing items specified above as galvanized.
 - 1. Galvanize the items after fabrication in accordance with the requirements of ASTM A 123/A 123M.
 - 2. Provide a minimum galvanized coating of 1.25 ounces per square foot (380 grams per square meter).
- C. Touch-Up Primer:
 - 1. For un-galvanized metal surfaces: Provide primer complying with the requirements of SSPC-Paint 15 for Type I, Red Iron Oxide.
 - 2. For galvanized surfaces: Provide primer complying with the requirements of SSPC-Paint 20 for Type I, Inorganic Zinc-Rich Primer.

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PART 3 EXECUTION

3.01 EXAMINATION

- A. Field Measurement:
 - 1. Although the Contract Drawings are generally indicative of the Work, take field measurements to verify actual conditions.
 - a. Due to the small scale of the Contract Drawings, it is not possible to indicate all offsets, fittings, and apparatus required or the minor structural obstructions that may be encountered during the Work.
 - 2. Carefully investigate the structural and finish conditions, and other construction work, at the Site, which may affect the work of this Section.

3.02 PREPARATION

- A. After carefully investigating structural and finish conditions and other in-place construction work, produce detailed Shop Drawings showing proposed departures from the original design due to field conditions or other causes.
 - 1. Layout the electrical work according to accepted standard electrical trade practice to suit actual field measurements.
 - 2. Arrange the electrical work to consider existing conditions and to preserve access to other equipment, rooms, areas, and similar features of the construction.
 - 3. Provide plan and profile views of duct banks, and show equipment backboards and support structures not directly fastened to the walls on the Shop Drawings.
 - 4. Indicate the location and details of conflicting utility construction and slopes on the Shop Drawings.
 - 5. Submit the Shop Drawings to the Engineer for approval prior to performing the Work of this Section.
- B. Obtain roughing-in dimensions of electrically operated equipment, including equipment being installed by both electrical and other construction trades.
 - 1. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.
 - 2. Arrange electrical Work accordingly and furnish such fittings and apparatus as required to accommodate such conditions and to preserve access to other equipment, rooms, areas, and similar spaces.

3.03 INSTALLATION

- A. Install electrical Work in conformance to the requirements of NFPA 70 for wiring methods general requirements, and to other applicable Articles of the NEC governing methods of wiring.
- B. Installing Anchors and Fasteners:
 - 1. For anchoring or fastening applications in masonry and hollow-core precast concrete structural elements, provide masonry anchors as specified herein.

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2. For anchoring or fastening applications in cast-in-place concrete and solid precast concrete structural elements, provide concrete anchors as specified herein.
 3. Threaded Bolts:
 - a. Draw threaded bolted connections up tight using 316 stainless steel lock washers to prevent the bolt or nut from loosening.
 4. Drilled-In Expansion Anchors:
 - a. Install expansion anchors in strict accordance with manufacturer's instructions and the following.
 - 1) Drill holes to the required diameter and depth in accordance with anchor manufacturer's instructions for the size of anchor being installed.
 - 2) Minimum Embedment:
 - a) Embed expansion anchors to four and one-half bolt diameters minimum unless otherwise indicated on the Contract Drawings.
- C. Installing Conduit Supports:
1. For exterior locations, provide malleable iron conduit supports.
 2. For interior locations, provide stamped steel conduit supports.
- D. In areas designated as wet, NEMA 3, NEMA 3R, NEMA 4X, NEMA 12, or NEMA 13 as defined in NEMA 250; secure equipment and conduit to no fewer than two 7/8-inch minimum depth, non-metallic channels mounted vertically on the walls.

3.04 REPAIR/RESTORATION

- A. Coatings:
1. Repair damage to coatings.
 - a. Touch up damaged coating surfaces using the specified primer for primed steel surfaces, and using zinc-rich primer for galvanized steel surfaces.

3.05 FIELD QUALITY CONTROL

- A. Inspection:
1. Verify the adequacy of coatings.
 2. Inspect the items provided under this Section for adherence to the fabrication tolerances specified above, and correct any discrepancies:

3.06 PROTECTION

- A. Protect the items provided under this Section from damage during the work of other trades.

END OF SECTION

SECTION 16075 ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for furnishing, installing, and protecting identification signs and labels for electrical systems.
- B. Related Section:
 - 1. Section 16050 - Basic Electrical Materials and Methods.
 - 2. Section 16122 - Low-Voltage Wire, Cable, and Accessories.
 - 3. Section 16420 – Motor Controllers.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z535.4, Product Safety Signs and Labels.
- B. National Electrical Manufacturer's Association (NEMA):
 - 1. NEMA 250, Enclosures for Electrical Equipment.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code (NEC).
 - 2. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.

1.03 SUBMITTALS

- A. Submit the following information for approval in accordance with the requirements of Section 01330 and Section 16050:
 - 1. Product Data:
 - a. Provide catalog cuts for the actual products provided, and indicate clearly the usage of each product.
 - 2. Shop Drawings:
 - a. Provide a schedule depicting all nametag legends.
 - b. Provide drawings of typical nametags.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with the all applicable requirements of OSHA, but particularly those stated in 29 CFR 1910.144 and 29 CFR 1910.145.
 - 2. Comply with the requirements of NFPA 70E that are applicable to electrical identification items as listed below in this Specification Section.

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1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect items from damage during delivery, storage, and handling in accordance with Section 16050 and as detailed below.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products meeting the specified requirements from one of the following manufacturers, unless otherwise indicated:
 - 1. Brady Worldwide, Inc.
 - 2. Seton Identification Products
 - 3. LEM Products, Inc.
- B. To serve as examples of the quality required of the specified products, several Brady Worldwide, Inc. Product Numbers are listed for informational purposes only.

2.02 MATERIALS

- A. Laminated Phenolic or Plastic:
 - 1. Provide rigid, thermosetting resin or polymer material that is heat- and fire-resistant, abrasion resistant, electronically non-conductive, and non-corroding.
 - 2. Extrude the thermosetting resin or polymer into sheets, and laminate the sheets together so that colored top and bottom layers sandwich a contrasting color core in the middle.
- B. Mounting Hardware:
 - 1. Provide number 10 hex-head machine screws and lock-washers, or hex-head bolts, lock-washers, and nuts for mounting identification nameplates onto electrical equipment.
 - 2. Provide either type 316 stainless steel or brass fasteners; however, all fasteners used on the same nameplate must be of the same material.

2.03 EQUIPMENT IDENTIFICATION NAMEPLATES

- A. Provide laminated phenolic or plastic equipment identification nameplates having beveled edges and engraved lettering.
 - 1. Drill holes for mounting hardware in the equipment identification nameplates as follows:
 - a. For nameplates that are more than 2 inches wide, drill four holes.
 - b. For nameplates that are more than 1-1/2 inches high, drill four mounting holes.
 - c. For smaller nameplates, drill holes for two fasteners.
 - 2. Provide equipment identification nameplates long enough to ensure that the heads of fastening hardware do not extend beyond the nameplate material, and come no

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closer than 1/16-inch to the nearest letter of the nameplate legend and no closer than 1/16-inch to the nearest edge.

2.04 CONDUIT AND RACEWAY LABELS

A. Conduit Voltage Markers:

1. Provide conduit markers consisting of polymer-coated cloth tape with a printable top coat and a rubber based pressure sensitive adhesive on the back to provide oil and water resistance, good print durability, and the flexibility to allow it to be wrapped around curved surfaces.
2. Clearly mark the voltages in black lettering on orange colored tape backgrounds.

B. Conduit Wiring System Identification:

1. Provide companion type labeling markers to indicate the wiring system in each raceway and consisting of a vinyl film substrate with a pressure sensitive acrylic adhesive backing.
2. Clearly mark the wiring systems in black lettering on orange colored tape backgrounds.
3. To properly identify each electrical system in the raceway, provide the following, or similar, wording on the labeling markers corresponding to the systems:
 - a. For electrical power systems, word the labels "POWER".
 - b. For control systems, word the labels "CONTROL".
 - c. For instrumentation systems, word the labels "INSTR."
 - d. For supervisory control and data acquisition systems, word the labels "SCADA",

C. Conduit Feeder Identification:

1. Provide conduit feeder identification markers consisting of polymer-coated cloth tape with a printable top coat and a rubber based pressure sensitive adhesive on the back to provide oil and water resistance, good print durability, and the flexibility to allow it to be wrapped around curved surfaces.
2. Provide conduit feeder identification labels that identify the feeder circuit with 3/4-inch high black lettering on yellow backgrounds.

D. Conduit and Raceway Label Dimensions:

1. Provide label color field lengths and lettering height as indicated in Table 16075-1:

Table 16075-1 Conduit and Raceway Label Sizes		
Raceway Outside Diameter (Inches)	Background Length (Inches)	Lettering Height (Inches)
3/4 to 2	7	1
1-1/2 to 2	7	1
2-1/2 to 6	14	1-1/4

E. Product Examples:

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1. Conduit Voltage Markers: Brady Worldwide, Inc., B-946 custom self-sticking pipe markers or color code tape.
2. Conduit Wiring System: Brady Worldwide, Inc., B-946 custom self-sticking pipe markers or color code tape.
3. Conduit Feeder Identification: Brady Worldwide, Inc., Product Number 31964.

2.05 WARNING LABELS:

- A. Provide and install arc flash labels in accordance with NFPA 70 and NFPA 70E.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to installing electrical identification items, verify with the Engineer that the data on each is correct.

3.02 INSTALLATION

- A. Wiring Identification:
 1. Identify wiring in conformance with the requirements of Section 16122.
- B. Conduit and Raceway Identification:
 1. Identify the wiring systems in conduit and raceway by providing companion type labeling markers to indicate the systems in each.
 2. Identify the Voltages carried in conduit and raceway by providing voltage labeling markers on all accessible raceways.
 3. Identify feeders by providing identification labels.
- C. Electrical Box Identification:
 1. For each pull box, wire trough and junction box, if it is not otherwise indicated, install a laminated phenolic identification nameplate with 1/8-inch white letters on a black background above or next to the box identifying its source of power; for example, indicate the panelboard and circuit number supplying power to a box with an identification nameplate.
- D. Electrical Equipment Identification:
 1. Provide identification nameplates on the front of the following electrical equipment:
 - a. Low-voltage variable frequency controllers as specified in Section 16425.
 - b. Disconnect switches as specified in Section 16440.Install nameplates at the top center of the front face of the electrical equipment in a visible location. Fasten the nameplate to the enclosure using 316 stainless steel screws or an approved equal.

END OF SECTION

SECTION 16080 ELECTRICAL TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: The work specified in this Section consists of materials to performance test electrical systems and equipment.
 - 1. Items Supplied Under This Section:
 - a. Electrical Testing
 - b. Ground Testing
 - c. Insulation Testing
 - d. Equipment Testing
 - e. Test Procedure
 - f. Test Report
- B. Related Sections:
 - 1. Division 1 – General Requirements
 - 2. Division 16 Sections, As Applicable

1.02 REFERENCES

- A. Applicable Documents and Testing Requirements of:
 - 1. America National Standards Institute (ANSI): as applicable, including:
 - a. ANSI C2, National Electrical Safety Code.
 - b. ANSI Z244.1 American National Standards for Personnel Protection.
 - 2. National Electrical Manufacturer's Association (NEMA): as applicable, including:
 - a. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation and Maintenance of Motor Control Centers.
 - b. NEMA ICS 7.1 - Safety Standards for Construction and Guide for selection, Installation, and Operation of Adjustable Speed Drive Systems.
 - c. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - 3. American Society for Testing and Materials (ASTM), as applicable.
 - 4. Institute of Electrical and Electronics Engineers (IEEE), as applicable, including:
 - a. IEEE C.57.13, IEEE Standard Requirements for Instrument Transformers.
 - 5. National Fire Protection Association (NFPA), as applicable, including:
 - a. NFPA 70 - National Electrical Code (NEC).
 - b. NFPA 70E - Electrical Safety Requirements for Employee Workplaces.
 - 6. Insulated Cable Engineer's Association (ICEA), as applicable.
 - 7. State and Local Codes and Ordinances as applicable.
 - 8. Occupational Safety and Health Administration (OSHA), as applicable, including:
 - 9. Title 29, Parts 1907, 1910, and 1936.
 - 10. International Electrical Testing Association (IETA) as applicable, including:
 - a. ATS-2003: Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.

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- b. MTS-2001: Maintenance Testing Specifications for Electric Power Distribution Equipment and Systems.

1.03 SUBMITTALS

- A. Submit documentation as required by this Section of the Contract to the Design Engineer in strict accordance with the provisions of Section 16050 for review, comments, and subsequent approval.
- B. Submission to include the following:
 - 1. Field inspection report as required for each item of material and/or equipment outlined herein.
 - 2. Manufacturer's directions for use of ground megger with proposed method indicated.
- C. Test Reports:
 - 1. Each test report prepared by the respective testing firm(s) comply, where applicable, to all stipulations specified in Section 16050 for Operation, Maintenance and Installation Manuals with reference to preparation, paper requirements, indexing and binders. Include in each test report the following:
 - a. Summary of project.
 - b. Description of equipment tested.
 - c. Description of test.
 - d. Test results.
 - e. Conclusions and recommendations.
 - f. Appendix, including appropriate test forms.
 - g. Identification of test equipment used.
 - h. Signature of responsible test organization authority.
 - i. Furnish five copies of each completed report to the Design Electrical Engineer no later than 30 days after completion of each test. Assemble and certify the testing firm each final test report, which must be submitted to the Design Engineer for review, comments, and subsequent approval.

1.04 QUALITY ASSURANCE

- A. Qualifications of Testing Laboratory: Select an independent nationally recognized testing laboratory that is independent from electrical contractor that either is a member of The International Electrical Testing Association or meets the following qualifications:
 - 1. Is nationally recognized as an electrical testing laboratory.
 - 2. Has been regularly engaged in the testing of electrical systems and equipment for at least 5 years.
 - 3. Is independent from the electrical contractor, the Owner, the Engineer and all other contractors on the job.
 - 4. Has at least one Professional Engineer on staff that is licensed in the State where the project site is located.

SECTION 16080 ELECTRICAL TESTING

5. Derives more than 80 percent of its income from electrical testing.
 6. Owns or leases sufficient calibrated equipment to do the testing required.
 7. Has a means to trace all test instrument calibration to The National Bureau of Standards.
- B. Membership in the International Electrical Testing Association (NETA) shall be considered evidence of meeting items A. 1 through and including A. 5.
- C. Testing shall be done under the supervision of a technician certified by International Electrical Testing Association or by technicians that are both certified by the National Society of Professional Engineers and experienced in electrical testing with 5 years of testing experience.
- D. The testing laboratory shall supervise or perform all testing of equipment and oversee setting of all circuit breakers and calibration of all instruments.
- E. The testing firm used must be approved by the Engineer.
- F. Include the cost of such tests in the Contractors Bid Price for the applicable bid item.

1.05 GENERAL REQUIREMENTS

- A. Field Inspection:
1. This Contractor is responsible for a complete inspection of all equipment, prior to testing and energizing to ascertain that it is free from any damage, scratches, or missing components and that all power connections are correct, and that they are tight in conformance with recommended standard practice. The inspection is to also include a check of control wiring, terminal connections and all bolts and nuts.
 2. Perform field inspection by this Contractor during a time when the Field Engineer and the Design Engineer are present to witness each inspection and its performance.
 3. Correct any deficiencies found during the inspection by this Contractor prior to the energizing and testing of the equipment.

1.06 SCHEDULING

- A. Schedule all testing with work of other contractors to ensure an orderly sequence of startup and completion of work.

PART 2 PRODUCTS

NOT USED

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PART 3 EXECUTION

3.01 ELECTRICAL INSPECTIONS AND TESTS

- A. Perform, supervise, and furnish all test equipment needed to perform tests and provide safety measures, procedures, and equipment required for each test.
- B. Schedule all testing with the Engineer. Perform testing in the presence of the Engineer except when the Engineer approves in writing conducting a specific test without the Engineer's presence.
- C. Notify all involved parties including the Engineer prior to tests, advising them of the test to be performed and the scheduled date and time.
- D. Coordinate the tests with others involved.
- E. Prepare written test procedures and forms used in the test reports and submit for approval prior to commencement of testing.
- F. Include in each test report the following information:
 - 1. Job title.
 - 2. Date of test.
 - 3. Equipment, system, or cable identification.
 - 4. Type of test.
 - 5. Description of test instrument and date of latest calibration.
 - 6. Section of specification defining test along with description of test and evaluations as reported by the testing company.
 - 7. Test results (correct all readings at 20 degrees C).
 - 8. Signature of person supervising test.
 - 9. Signature of Contractor.
 - 10. Space for Engineer's signature.
- G. Refer to individual tests and inspections hereinafter specified for any additional or specified requirements.
- H. Test Instrument Calibration:
 - 1. The testing firm is to have a calibration program, which assures that all applicable test instrumentations are maintained within rated accuracy.
 - 2. The accuracy is to be directly traceable to the National Bureau of Standards.
 - 3. Instruments are to be calibrated in accordance with the following frequency schedule.
 - a. Field Instruments:
 - i.) Analog - 6 months maximum
 - ii.) Digital - 12 months maximum
 - b. Laboratory Instruments: 12 months
 - c. Leased specialty equipment: 12 months

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4. Make dated calibration labels visible on all test equipment.
5. Keep records up-to-date, which show date and results of instruments calibrated or tested.
6. Maintain an up-to-date instrument calibration instruction and procedure for each test instrument.
7. Calibrating standard is to be of higher accuracy than that of the instrument tested.

I. Safety and Precautions:

1. Safety practices are to include, but are not limited to, the following requirements:
 - a. Occupational Safety and Health Act of 1970-OSHA.
 - b. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4.
 - c. Applicable State and Local safety operating procedures.
 - d. IETA Safety/Accident Prevention Program.
 - e. Owner's safety practices.
 - f. National Fire Protection Association - NFPA 70E.
 - g. ANSI Z244.1 American National Standards for Personnel Protection.
2. Perform all tests with apparatus de-energized except where otherwise specifically required.
3. The testing firm is to have a designated safety representative on the project to supervise operations with respect to safety.

3.02 TESTING TO BE PERFORMED BY THE CONTRACTOR

A. NOT USED

- B. Continuity Test:** Make test for continuity and correctness of wiring and identification on all conductors installed.

C. Wire and Cable:

1. Test all wires and cables sized No. 2 and larger in accordance with NETA ATS-2003, paragraph 7.3.1.1 and 7.3.1.2.
2. Perform visual, mechanical, and electrical tests on all No. 4 and No. 6 power cables that operate at voltages exceeding 150 volts to ground in accordance with NETA ATS-2003, paragraph 7.3.1.1 and 7.3.1.2.
3. Perform visual, mechanical, and electrical tests on all other wires and cables in accordance with NETA ATS-2003, paragraph 7.3.1.1.
4. Replace any wires, which have been damaged.
5. Correct causes of all readings, which do not meet the acceptable minimum insulation readings, as stated in NETA ATS-2003, paragraph 7.3.1.3. Exceed the nominal expected temperatures for the actual load.
6. Retest items requiring correction.

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3.03 TESTING TO BE PERFORMED BY THE TESTING LABORATORY

- A. Select, hire and pay an independent nationally recognized electrical testing laboratory to perform all testing specified in this article. Obtain Owner's approval of the testing laboratory and the testing laboratory proposed test procedure prior to commencement of any tests.
- B. AC Motor Testing:
 - 1. Visually and mechanically inspect and electrically test all AC motors in accordance with NETA ATS-2003, paragraph 7.15.1.1 and NETA ATS-2003, paragraph 7.15.1.2.
 - 2. Acceptable test values are as stated in NETA ATS-2003, paragraph 7.15.1.4.
 - 3. Immediately report all motors, which fail inspection to the Engineer for correction.
- C. Motor Starter Tests:
 - 1. Visually and mechanically inspect and electrically test all motor starters in accordance with NETA ATS-2003, paragraph 7.16.1.1.1 and NETA ATS-2003, paragraph 7.16.1.1.2.
 - 2. Acceptable values are as stated in NETA ATS-2003, paragraph 7.16.1.1.3.
- D. Perform phase loss and phase rotation testing for each motor.
 - 1. Measure current and voltage between phase-to-neutral and phase-to-phase for each motor. Report all abnormal reading to the Engineer.
 - 2. Record voltage and current between phase-to-neutral and phase-to-phase for each motor with a data logger/recorder for a continuous period of 24-hours. Report all abnormal reading to the Engineer.

3.04 TESTING TO BE PERFORMED BY MANUFACTURER'S REPRESENTATIVE

- A. AC Variable Frequency Controller (VFC) Tests:
 - 1. On completion of the installation, the initial start-up shall be performed by a factory-trained representative of the AC drive manufacturer. Two copies of operating and maintenance instruction books shall be supplied for the test of the AC drives.
 - 2. Provide equipment manufacturer's certification that the AC drives are installed, inspected, tested, adjusted, and approved satisfactory by equipment manufacturer's service engineer.
 - 3. Instruct Owner's personnel regarding equipment operation and maintenance procedures.
 - 4. Furnish copies of complete lists of spare parts and special tools recommended for 2 years of normal operation of the complete system including the manufacturer's name, addresses, catalog numbers, and prices.

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- B. Furnish copies of complete lists of spare parts and special tools recommended for 2 years of normal operation of the complete system including the manufacturer's name, addresses, catalog numbers, and prices.

3.05 CORRECTION OF DEFICIENCIES

- A. Report all unacceptable values immediately. Correct all deficiencies found in work of this contract and separately report deficiencies in work of items of other contracts.
 - 1. Retest items requiring correction. Correct or have corrected any remaining deficiencies and retest until work is acceptable.

END OF SECTION

SECTION 16122
LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for furnishing, installing, connecting, energizing, testing, cleaning, and protecting low voltage cable, shielded cable, and accessories.
- B. Related Sections:
 - 1. Section 16050 - Basic Electrical Materials and Methods.
 - 2. Section 16060 - Grounding and Bonding.
 - 3. Section 16075 - Electrical Identification.
 - 4. Section 16080 - Electrical Testing.
 - 5. Section 16138 - Boxes.

1.02 REFERENCES

- A. American Society for Testing Materials (ASTM):
 - 1. ASTM B 8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
- B. Institute of Electrical and Electronic Engineers (IEEE):
 - 1. IEEE 383 - Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations.
 - 2. IEEE 1202 - Standard for Flame-Propagation Testing of Wire and Cables.
- C. National Electrical Manufacturer's Association (NEMA):
 - 1. NEMA WC 26/EEMAC 201 - Binational Wire and Cable Packaging Standard.
 - 2. ANSI/NEMA WC 57 - Standard for Control, Thermocouple Extension, and Instrumentation Cables.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code (NEC).
- E. Underwriter's Laboratories, Inc. (UL):
 - 1. UL 13 - Standard for Power-Limited Circuit Cables.
 - 2. UL 1277 - Standard for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - 3. UL 1569 - Standard for Metal-Clad Cables.
 - 4. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - 5. UL 1685 - Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.
 - 6. UL 2250 - Standard for Instrumentation Tray Cable.
- F. Insulated Cable Engineers Association (ICEA):

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LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

1. ICEA T-29-520 - Vertical Cable Tray Flame Test @ 210,000 BTU.

1.03 DESIGN REQUIREMENTS

- A. Conductors in Raceway and Conduit Systems:
 1. Provide conduit systems for installing the wiring that is outside of equipment.
 2. Except for raceway or conduit for control wires or where otherwise indicated on the Contract Drawings, design raceway and conduit systems so that the maximum number of low-voltage conductors in each raceway or conduit does not exceed 4, including three phase conductors and one neutral, plus a ground.
- B. Cable Tension Design Requirements:
 1. Design conduit runs so that the tension limits set by the wire and cable manufacturers will not be exceeded.
 - a. Provide additional pulling points as required to limit the tension to acceptable levels.
- C. Product Data and Catalog Cuts:
 1. Submit low-voltage ground, power, and control wiring product data as listed below for the products provided as the Work of this Section; and clearly indicate the usage of each product on the data submitted.
 - a. Wires and cables.
 - b. Lugs.
 - c. Connectors.
 - d. Tapes.
 - e. Pulling lubricant.
 - f. Tools used to crimp connectors.
- D. Use of Trade Names:
 1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
 - a. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

1.04 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Submittal Procedures:
 1. Product Data:
 - a. Wires and cables.
 - b. Lugs
 - c. Connectors.
 - d. Tape.
 - e. Pulling lubricant.
 - f. Crimping tools.

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2. Samples:
 - a. Wire samples.
3. Quality Assurance/Control Submittals:
 - a. Certificates.
 - 1) Testing agency/quality verification.
 - b. Manufacturers Instructions.
 - 1) Cable manufacturer's recommendations.
 - c. Qualification Statements.
 - 1) Documented experience of the installing firm.
 - 2) Qualifications of the licensed electricians supervising the Work.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. To install the Work of this Section, employ the services of a firm specializing in installing wire, cable, and accessories, and that has a minimum of 3 years experience doing so.
 - 1) Submit the documented experience of the firm installing the wire, cable, and accessories.
 - b. To supervise installation of the Work of this Section, employ licensed electricians.
 - 1) Submit the qualifications of the licensed electricians supervising the Work of this Section.
- B. Regulatory Requirements:
 1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70, and to all other applicable state, local, and national governing codes and regulatory requirements.
- C. Certifications:
 1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location installed in, and the application intended, unless products meeting the requirements of these testing laboratories are not available or unless standards do not exist for the products.
 - a. Provide copper conductors listed and labeled by UL for all wiring.
 2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.
- D. Field Samples:
 1. Submit one 36-inch long sample of each type of wire to be used.

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LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Imprint insulated conductors with the date of manufacture, the wire type, and the manufacturer.
 - 2. Package wire and cable in conformance with the requirements of NEMA WC 26/EEMAC 201.
 - 3. Protect items from damage during delivery, handling, and installation.
 - a. Comply with the cable manufacturer's recommendations for inspection, handling, storage, temperature conditioning, bending and training limits, pulling limits, and calculation parameters for installing cable.
 - b. Submit the cable manufacturer's recommendations for inspection, handling, storage, temperature conditioning, bending and training limits, pulling limits, and calculation parameters for installing cable
- B. Acceptance at Site:
 - 1. Wire and cable manufactured more than 12 months before delivery to the Site is unacceptable for use under this Contract, and will be rejected.
- C. Storage and Protection:
 - 1. Store products indoors on blocking or pallets.
 - 2. Protect items from damage during storage.

1.07 MAINTENANCE

- A. Operation and Maintenance Manuals:
 - 1. Include product data for the products provided as the Work of this Section in the Operation and Maintenance Manuals submitted with the record drawings at project closeout in accordance with Closeout Submittal requirements.

PART 2 PRODUCTS

2.01 POWER AND CONTROL CABLES

- A. Conductor Design Requirements:
 - 1. Provide conductors of the proper size and ampacity ratings based on Article 310 of NFPA 70.
 - a. Provide copper conductors that have 98 percent conductivity.
 - b. Unless otherwise indicated on the Contract Drawings, at a minimum provide conductors of the following American Wire Gauge (AWG) sizes:
 - 1) For power and branch feeder circuits: 12 AWG.
 - a) For power and branch feeders, provide solid copper low-voltage conductors for sizes up to and including 10 AWG, provide stranded copper low-voltage conductors for 8 AWG and larger sizes.
 - 2) For control circuits: 14 AWG.
 - 3) For alarm and status circuits: 14 AWG.

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LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

- 4) For single conductor instrument wiring: 14 AWG.
- 5) For multiple conductor instrument wiring: 16 AWG.

B. Insulation Design Requirements:

- 1. Provide low voltage ground, power, and control wiring having the proper insulation types as follows:
 - a. For exterior, wet, and damp locations, including NEMA 4X locations: Type XHHW-2.
 - b. For underground wiring:
 - 1) For sizes 14 AWG through 10 AWG: Type XHHW-2.
 - 2) For sizes 8 AWG and larger: Type RHW-2.
 - c. For wiring that is wholly in dry indoor locations: Type XHHW-2, or dual-rated Type THHN/THWN.
 - d. Provide 600V insulation rating.

C. Manufacturers

- 1. Acceptable Manufacturers:
 - a. Cablec Continental Co.
 - b. SouthWire.
 - c. Okonite Co.
 - d. Rome Cable Corp
 - e. Or Approved Equal

2.02 SIGNAL CABLES

A. Shielded Instrumentation Cable (2/C Cable):

- 1. Provide 100 percent shielded, two-conductor, 16 AWG twisted pair cable.
 - a. Provide NFPA 70 (NEC) Class CL2 cable that is UL (recognized) Style 20253, and has a 90 degree temperature rating.
 - b. Conductors:
 - 1) Provide stranded (19 x 29 AWG) tin-coated copper conductors.
 - c. Shielding:
 - 1) Provide aluminum-polyester foil shielding that incorporates an 18 AWG stranded tinned copper drain wire.
 - d. Insulation:
 - 1) Provide color coded insulation rated for 600 volts and consisting of polyethylene covered by an overall PVC jacket.
- 2. Acceptable Manufacturers:
 - a. Belden, Inc., Part Number 8719,
www.belden.com/pdfs/03Belden_Master_Catalog.
 - b. Alpha Wire
 - c. West Penn
 - d. Or Approved Equal

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LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

2.03 ACCESSORIES

A. Cable Lubricant:

1. Provide cable lubricant specifically recommended by the cable manufacturer for cable pulling operations.
 - a. For rubber of plastic jacketed cables, provide soapstone, graphite, or talc cable lubricant.

B. Tapes:

1. Arc Proofing Tape:
 - a. Provide fire retardant arc proofing tape, such as Scotch® 77 Fire Retardant Electric Arc Proofing Tape, that is capable of protecting cables from fault arc generated heat and flames and of protecting adjacent wrapped cables and accessories exposed to fault arcs until limiting devices can interrupt the faulted circuit.
2. Vinyl Insulating Tape:
 - a. Provide UL-listed flexible polyvinyl chloride (PVC) backed insulating tape with a pressure sensitive adhesive, such as black Scotch® 33+ Vinyl Electrical Tape, that is resistant to abrasion, acids, alkalis, and copper corrosion; resistant to, hot, cold and wet weather; and resistant to damage from UV sunlight exposure.
3. Rubber Splicing Tape:
 - a. Provide highly conformable, linerless, self-bonding, ethylene rubber (EPR), high-voltage (through 69 kV) insulating tape formulated to provide excellent thermal dissipation of splice heat, and designed to insulate splices and terminate cables whose overload temperatures can reach 130 degrees Celsius, such as Scotch® 130C Linerless Rubber Splicing Tape.
4. Manufacturers:
 - a. 3M, Scotch, http://solutions.3m.com/portal/3M/en_US.
 - b. Plymouth, www.plymouthrubber.com.
 - c. Permacel, www.permacel.com.
 - d. Approved equal.

C. Tubing:

1. Heat Shrinkable Tubing:
 - a. Provide flexible, flame retardant, polyolefin heat shrinkable thin wall tubing that has good resistance to common fluids and solvents, and has a high dielectric strength.
2. Waterproof Splice Kits:
 - a. Provide heat shrinkable thin wall polyolefin electrical cable splice kits.
3. Manufacturers:
 - a. Tyco Electronics, CGPT, <http://catalog.tycoelectronics.com>.
 - b. Thomas & Betts Corp., www.tnb.com.
 - c. Approved equal.

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LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

D. Wire and Cable Connections:

1. Grounding Connectors:
 - a. Provide grounding connectors conforming to the requirements of Section 16060, Grounding and Bonding.
2. Connectors for Service Wires and Cables, and for Wires and Cables Larger Than Number 6:
 - a. Split Bolt Connectors or Compression Type Connectors:
 - 1) Provide UL-listed split bolt connectors or compression type connectors for making parallel or butt splices of stranded copper wire.
 - 2) Use companion preformed plastic insulating covers or tape insulation conforming to NFPA 70 (NEC) requirements.
 - b. Mechanical compression connectors:
 - 1) Provide mechanical compression connectors that are capable of connecting single or multiple conductors, and of being installed with one wrench.
 - a) Type: Compact, two-hole mechanical compression connectors having two clamping bolts.
 - (1) Connector Body: Provide a high copper bronze or brass alloy body.
 - (2) Bolts: Provide brass or bronze bolts; plated steel screws are unacceptable.
 - (3) Fasteners: Provide silicon-bronze fasteners for bolting connectors to connections.
 - c. Crimped Compression Connectors:
 - 1) Provide two-hole crimped compression type connectors fabricated from high conductivity, seamless, electrolytic wrought copper, electrolytically tin-plated, and color coded to match the dies.
 - 2) Provide crimped compression type connectors with adequate area to conduct the electrical current.
 - 3) To crimp connectors, provide crimping tools from the same manufacturer that manufactured the connectors.
3. Control Wiring Connections:
 - a. For control wiring connections at terminal boards, provide crimped nylon-insulated ring terminals.
 - b. For control wiring splices, provide nylon insulated butt splices with insulation grips.
 - c. For joining more than two control wires, provide junction boxes with terminal boards.
4. Instrumentation Cable Connectors:
 - a. For connecting instrumentation cable and the equipment being furnished under this Contract, provide companion type connectors.
 - 1) For equipment controllers/enclosures that are furnished under other Sections of this Contract, furnish the connectors for connecting cable to the equipment with the equipment.
 - 2) Terminate the wiring as required for proper operation.

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- b. Manufacturers:
 - 1) Thomas & Betts Corp., www-public.tnb.com/ps/pubint.
 - 2) AMP Inc., www.amp.com.
 - 3) Ilsco Corp., <http://ilsco.com>.
 - 4) Ideal Industries, Inc., www.idealindustries.com/products/index.htm.
- 5. Connectors for Other Conductors:
 - a. Any of the applicable types listed for larger wire may be provided.
 - b. Screw Terminal Connections:
 - 1) For making terminal connections of stranded copper wire to screw terminals, provide nylon insulated crimped compression terminals with copper barrel on the wire.
 - 2) For making terminal connections of solid copper wire to screw terminals, provide screw lock connectors.
 - c. Wire Nuts:
 - 1) For making splices of copper wire, provide pre-insulated, UL-listed, solderless connectors of the spring-lock or compression type that can be installed by hand or using tools.
 - 2) For site lighting, wire nuts used in underground or below grade locations is prohibited. There only permitted use for site lighting is within a pole base.
 - d. Manufacturers:
 - 1) Thomas & Betts Corp., www-public.tnb.com/ps/pubint.
 - 2) Tyco Electronics, AMP Inc., www.amp.com.
 - 3) Ilsco Corp., <http://ilsco.com>.
 - 4) FCI-Burndy® Products, <https://portal.fciconnect.com>.
 - 5) Approved equal.

2.04 SOURCE QUALITY CONTROL

- A. Tests:
 - 1. 600 Volt Rated Multi-Conductor Cable:
 - a. 70,000 BTU/hr Vertical Tray Flame Test:
 - 1) 600 Volt rated multi-conductor cable must pass the vertical tray flame test requirements of UL 1569, IEEE 383, and IEEE 1202.
 - b. 210,000 BTU/hr Vertical Tray Flame Test:
 - 1) 600 Volt rated multi-conductor cable must pass the vertical tray flame test requirements of ICEA T-29-520.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Install the work of this Section only under the supervision of licensed electricians.

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LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

3.02 EXAMINATION

- A. Inspect all conduits, junction boxes, electrical vaults, and handholes to verify that they are clean, that they do not have burrs, that conduits are properly aligned, and that they are complete.
 - 1. Ensure that on all conduits without threaded hubs, two locknuts are installed.
 - 2. Ensure that in all conduits with wires larger than No. 10, bushings are installed.
 - 3. Ensure that grounding bushings and fittings are installed at all places specified in Section 16060, Grounding and Bonding.
 - 4. Verify that proper sized boxes are installed.
- B. Verify that boxes and conduit fittings conform to the bending requirements specified in Article 314 of NFPA 70 (NEC).

3.03 PREPARATION

- A. Verify that pulling calculations have been made and are available for long conduit runs and pulls as indicated in this Section.
- B. Do not begin installing wiring until other work, which might cause damage to the wires, cables, or conduits, has been completed.
 - 1. Correct deficiencies in conduits, junction boxes, electrical vaults, and handholes that have been discovered by the inspection required in Paragraph 3.02.A.
- C. Prepare conduits to receive wire and cable.
 - 1. Swab the conduits with a nylon brush and steel mandrel.
 - 2. Pre-lubricate the conduits for which the pulling tension calculations are based on a coefficient of friction less than that of a dry conduit.
- D. Verify that a means of controlling the pulling tension on the wire or cable is installed on the mechanical assist devices furnished for pulling cable.
- E. Take the necessary precautions to prevent water, dirt, or other foreign material from accumulating in the conduits during the execution of wiring work.

3.04 INSTALLATION

- A. Low Voltage Ground, Power, and Control Wiring:
 - 1. Install Type CL2P, FPLP, or CMP cable as required by the application in accordance with the requirements of NFPA 70 (NEC).
 - a. For exposed low voltage wiring, use plenum cable.
 - b. For low voltage wiring concealed from view, only install wiring in the accessible locations permitted by the Contract Drawings.
 - 2. Neutral Conductors:
 - a. For each single-phase and each multi-phase feeder, provide separate neutrals.

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- b. For branch circuits, except at three-phase wye-connected panelboards, provide separate neutral conductors.
 - 1) For the three-phase wye-connected panelboards, provide common neutrals from 3 adjacent single-pole circuit breakers or from the poles of the same multi-pole circuit breaker.
 - c. Except for feeders with a small unbalanced and single-phase load, size each neutral the same as the largest phase conductor.
 - 1) For feeders with a small unbalanced and single-phase load, size the feeders to the largest of the following:
 - a) The size of any three-phase load connected to the neutral, which contains lighting, computer power outlets, instrumentation, or other electric loads.
 - b) The size required for 125 percent of the maximum unbalanced load.
- 3. Equipment Ground Conductors:
 - a. Provide a green equipment ground conductor with all runs.
 - 1) Provide the equipment ground conductor wire type as specified in Section 16060, Grounding and Bonding.
- B. Special Cable Installation Requirements:
 - 1. In addition to the other installation requirements specified within this Section, comply with the manufacturer's installation instructions for bending, pulling, connector types, and grounding when installing armored variable frequency drive cable.
 - a. Submit the manufacturer's installation instructions for armored variable frequency drive cable.
- C. Terminating Cable:
 - 1. Terminate cable using materials and methods indicated or specified herein, or in accordance with the written instructions of the cable manufacturer or termination kit manufacturer.
 - a. For equipment connections, provide split bolt or compression type connectors, mechanical compression connectors, or crimped compression type connectors as specified and approved by the equipment manufacturer; for all other types of connections provide connectors of one of the types specified:
 - 2. Protect insulated power and lighting cable terminations from accidental contact, deterioration of coverings, and moisture by using proper terminating devices and materials.
- D. Splicing Wire and Cable:
 - 1. Install all service and feeder conductors from end to end without splices.
 - 2. Install all motor conductors from the starter to the motor without splices.
 - 3. Only splice cables in accessible locations.
 - 4. Within outlet or junction boxes, make wire and cable splices that conform to the requirements of NFPA 70 (NEC).
 - a. Install these outlet or junction boxes in accessible locations.

SECTION 16122
LOW-VOLTAGE WIRE, CABLE, AND ACCESSORIES

E. Wiring Identification:

1. Color code all feeder wires and cables as indicated in Table 16122-1.

Table 16122-1 Feeder Wire and Cable Color Coding		
Phase	480/277 Volts	208/120 Volts
A	Brown	Black
B	Orange	Red
C	Yellow	Blue
Neutral	White with Yellow Tracer	White
Electrical Ground Conductor	Green	Green

2. Identify all power wiring by circuit and panelboard, and motor control center numbers.
3. Identify all control wiring with wire numbers.
4. Provide additional electrical identification of cabling and wiring as specified in Section 16075, Electrical Identification.

3.05 FIELD QUALITY CONTROL

A. Site Tests:

1. Prior to energizing wire and cable, field test the wire and cable as specified in Section 16080, Electrical Testing.

B. Inspection:

1. Record the actual installed elevations and locations of grounding cables and rods, both concealed and exposed, on the record drawings specified in Closeout Submittal requirements.
 - a. Verify that the control wiring wire numbers correspond to the numbers indicated in the record drawings.

END OF SECTION

SECTION 16131 CONDUIT AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for furnishing, installing, energizing, and testing conduit, and fittings for controls and electrical distribution lines.
- B. Related Section:
 - 1. Section 16050 - Basic Electrical Materials and Methods.
 - 2. Section 16060 - Grounding and Bonding.
 - 3. Section 16070 - Hangers and Supports.
 - 4. Section 16080 - Electrical Testing.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (Inch).
 - 2. ANSI C80.1 - Rigid Steel Conduit - Zinc-Coated (GCR).
 - 3. ANSI C80.3 - Electrical Metallic Tubing - Zinc Coated (EMT).
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 568/A 568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold Rolled, General Requirements for.
 - 2. ASTM D 1784 - Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- C. National Electric Manufacturer's Association (NEMA):
 - 1. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code (NEC).
- E. Underwriters Laboratory, Inc. (UL):
 - 1. ANSI/UL 6 - Standard for Rigid Metal Conduit.
 - 2. ANSI/UL 360 - Standard for Liquid-Tight Flexible Steel Conduit.
 - 3. ANSI/UL 498 - Standard for Safety for Attachment Plugs and Receptacles.
 - 4. ANSI/UL 797 - Electric Metallic Tubing - Steel.
- F. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. IEEE C2 - National Electrical Safety Code.

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1.03 DEFINITIONS

- A. Definitions for all items are as stated in NFPA 70, IEEE C2, and in other reference documents unless otherwise stated, specified, or noted.

1.04 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Contract Submittal Procedures:
 - 1. Product Data:
 - a. Rigid Polyvinyl Chloride (PVC) Conduit.
 - b. Non-metallic conduit solvent.
 - c. Liquidtight flexible metal conduit.
 - d. Rigid galvanized steel conduit (RGS).
 - e. Fittings for non-metallic conduit systems.
 - f. Fittings for metallic conduit systems.
 - g. Conduit spacers.
 - h. Wall and floor penetration seals.
 - i. Cold galvanize coating.
 - 2. Shop Drawings:
 - a. Product Data.
 - 3. Quality Assurance/Control Submittals:
 - a. Qualification Statements:
 - 1) Qualifications of the installer.
 - 2) Qualifications of the Electrical Testing Laboratory (ECL).
 - b. Certificates:
 - 1) Testing agency/quality verification, listing, and labeling.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Employ an installation firm with a minimum of three years documented experience installing conduit and tubing similar in type and scope to that required by this Contract to install the Work of this Section.
 - b. Employ skilled licensed electricians to supervise the Work of this Section.
 - c. Submit information verifying the installer's qualifications.
 - 2. Electrical Testing Laboratory (ECL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Contract Quality Requirements, and Section 16080, Electrical Testing, to perform the testing required by this Section.
 - b. Submit information verifying the ECL's qualifications.
- B. Regulatory Requirements:

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1. Perform the Work of this Section in accordance with the requirements specified in NFPA 70 (NEC), and to other applicable state, local, and national governing codes and regulatory requirements.
2. All items installed from utility service poles to the main service panels must be approved by the serving utility, whether electrical service or telephone service, as listed in Section 16050, Basic Electrical Materials and Methods.

C. Certifications:

1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory (ETL) for the location the product is installed in, and the application intended, unless products meeting the requirements of these nationally recognized testing laboratories are not available or unless standards do not exist for the products.
 - a. Submit evidence with the Product Data that the products represented meet testing agency quality verification requirements, including agency listing and labeling requirements.
 - 1) Such evidence may consist of either a printed mark on the data or a separate listing card.
 - b. Submit a written statement from those product manufacturers that do not provide evidence of the quality of their products that indicates why an item does not have a quality assurance verification.
 - 1) Such statements provided in lieu of quality assurance verification are subject to the acceptance of the Owner and the Engineer.

1.06 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Pack, ship, handle, and unload products in accordance with the requirements of Section 16050, Basic Electrical Materials and Methods, and as detailed herein.

B. Acceptance at Site:

1. Acceptance products at the Site in accordance with the requirements of Section 16050, Basic Electrical Materials and Methods, and as detailed herein.

C. Storage and Protection:

1. Store products in accordance with the requirements of Section 16050, Basic Electrical Materials and Methods, and as detailed herein.
 - a. Store all products indoors on blocking or pallets.

PART 2 PRODUCTS

2.01 NON-METALLIC CONDUIT

A. Electrical Plastic Tubing and Conduit:

1. Rigid Polyvinyl Chloride (PVC) Conduit:

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- a. Provide high impact PVC conduit conforming to the requirements of NEMA TC 2 at 90 degrees Celsius, and made from compounds conforming to the requirements of ASTM D 1784.
 - 1) Use material that at 78 degrees Fahrenheit has a tensile strength exceeding 5500 psi, a flexural strength exceeding 11,000 psi, and a compressive strength exceeding 800 psi,
 - b. Provide PVC conduits that are UL listed, labeled, or approved for both underground and above ground use.
 2. Manufacturers:
 - a. Lamson & Sessions, Carlon®, www.carlon.com.
 - b. Queen City Plastics, Inc., www.queencityplastics.com.
 - c. Approved equal.
- B. Non-Metallic Conduit Solvent:
1. Provide solvent for non-metallic conduit joints from the same manufacturer as the conduit and conforming to the requirements of ASTM D 2564.

2.02 METALLIC CONDUIT

- A. Liquidtight Flexible Metal Conduit:
1. Provide PVC coated flexible metal conduit conforming to the requirements of Article 350 of NFPA 70 (NEC) for materials and uses and ANSI/UL 360.
 2. Provide conduit with interlocking spiral strip construction capable of bending to a minimum radius of five times its diameter without deforming the spiral strips both inside and outside of the conduit.
 - a. Provide conduit with a flexible, galvanized, interlocking spiral strip steel core jacketed with smooth, liquid-tight polyvinyl chloride designed to withstand temperatures from minus 40 degrees Celsius to plus 60 degrees Celsius.
 3. Finish the interior and exterior of flexible conduit smooth and free from burrs, sharp edges, and other defects that may injure wires; and place the manufacturer's trademark on each length.
 4. Furnish an integral continuous copper ground in 3/4-inch through 1-1/4-inch PVC coated flexible metal conduit.
 5. Acceptable Manufacturers
 - a. Electri-Flex Company, Liquatite®, Type LA, www.electriflex.com.
 - b. ANAMET Electrical, Inc., Anaconda Sealtite®, www.anacondasealtite.com.
 - c. Approved equal.
- B. Rigid Galvanized Steel Conduit (RGS):
1. Provide rigid galvanized steel conduit (RGS) conforming to the requirements of Article 344 of NFPA 70 (NEC) for materials and uses, ANSI C80.1, and UL 6.
 2. Fabricate the RGS from mild steel piping, galvanized or sherardized inside and outside, and protected against corrosion by a dichromate rinse or a zinc chromate coating.

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3. Provide defect free conduit bearing the UL label, and furnished in 10-foot minimum lengths with both ends threaded and one end fitted with a coupling.
 - a. Provide tapered NTP 3/4 inch per foot threads complying with ANSI/ASME B1.20.1.
4. Acceptable Manufacturers:
 - a. Tyco/Allied Tube and Conduit, www.alliedtube.com.
 - b. Wheatland Tube Company, Division of John Maneely Company, www.wheatland.com.
 - c. Approved equal.

2.03 CONDUIT FITTINGS

- A. Fittings for Non-Metallic Conduit Systems:
 1. Provide high impact non-metallic fittings conforming to same requirements as for the non-metallic conduit as specified in Article 2.01.
 2. Non-Metallic Conduit Expansion Fittings:
 - a. Provide a two-piece nonmetallic, noncorrosive, nonconductive, UL listed expansion fitting.
 3. Acceptable Manufacturers:
 - a. Lamson & Sessions, Carlon®, www.carlon.com.
 - b. Queen City Plastics, Inc., www.queencityplastics.com.
 - c. Approved equal.
- B. Fittings for Metallic Conduit Systems:
 1. Construct conduit bodies/fittings from cast malleable iron or cast steel.
 2. Conduit Outlet Bodies:
 - a. Provide malleable iron threaded entry type conduit outlet bodies with neoprene gaskets and cast steel conduit.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, www.appletonelec.com.
 - 2) EGS/O-Z/Gedney, www.o-zgedney.com.
 - 3) Approved equal.
 3. Conduit Unions:
 - a. Provide conduit unions capable of completing a conduit run when neither conduit end can be turned.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, UNF and UNY Unions, www.appletonelec.com.
 - 2) Thomas and Betts Company, Erickson® Coupling., www.tnb.contractor/docs/tnbhazardous.pdf.
 - 3) Approved equal.
 4. Conduit Outlet Boxes:
 - a. Provide malleable or cast iron conduit outlet boxes conforming to the requirements of UL 886, and having a cover with O-rings to keep out moisture.
 - b. Acceptable Manufacturers:

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- 1) EGS/Appleton Electric, GRF outlets and covers, www.appletonelec.com.
 - 2) EGS/O-Z Gedney, www.o-zgedney.com.
 - 3) Approved equal.
5. Conduit Device Boxes:
- a. Provide malleable iron conduit device boxes with internal grounding screws and conforming to the requirements of UL 498 and UL 514A.
 - b. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, FD device boxes, www.appletonelec.com.
 - 2) EGS/O-Z Gedney, www.o-zgedney.com.
 - 3) Approved equal.
6. Conduit Sealing Fittings:
- a. Provide, triple coated, malleable iron conduit sealing fittings.
 - 1) Coat the conduit sealing fittings with zinc electroplate, dichromate, and an epoxy powder coat.
 - b. Provide drain fittings in conduit sealing fittings where required.
 - c. Provide sealing covers for junction boxes where required.
 - d. Acceptable Manufacturers:
 - 1) EGS/Appleton Electric, www.appletonelec.com.
 - a) Sealing hubs: ES.
 - b) Sealing fittings: EYSEF, EYSDEF, and EYD.
 - 2) EGS/O-Z Gedney, www.o-zgedney.com.
 - 3) Approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Although the Contract Drawings are generally indicative of the Work, take field measurements to verify actual conditions.
 1. Due to the small scale of the Contract Drawings, it is not possible to indicate all offsets, fittings, and apparatus required or the minor structural obstructions that may be encountered during the Work.
- B. Inspect the condition of existing conduit that is required for the Work of this Section.

3.02 PREPARATION

- A. After carefully investigating structural and finish conditions and other in-place construction work, prepare and submit detailed Shop Drawings showing proposed departures from the original design due to field conditions or other causes.
 1. Layout the electrical work according to accepted standard electrical trade practice to suit actual field measurements.
 2. Arrange the electrical work to consider existing conditions and to preserve access to other equipment, rooms, areas, and similar features of the construction.
 3. Indicate the location and details of conflicting utility construction and slopes.

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4. Submit these Shop Drawings to the Engineer for approval prior to performing the Work of this Section.
- B. Submit Product Data and catalog cuts for all products provided under this Section.
 1. Clearly indicate the usage of each product on the submittal.
 2. Include Product Data for the conduit and tubing provided under this Section with the Operation and Maintenance Manuals submitted in accordance with the requirements of the Contract and Project Closeout.
- C. Obtain roughing-in dimensions of electrically operated equipment, including equipment being installed by both electrical and other construction trades.
 1. Set conduit and boxes only after receiving approved dimensions and checking such equipment locations.
- D. Remove dirt, debris, and other obstructions from existing conduit required for the Work of this Section by blowing out and mandreling the conduits as applicable.

3.03 INSTALLATION

- A. Perform the Work of this Section as specified in Section 16050, Basic Electrical Materials and Methods.
- B. Fabricate and install conduit and wireway systems in accordance with accepted electrical trade standard practice.
 1. Layout the electrical work of this Section to suit actual field measurements.
 - a. Record the actual installed elevations and locations of duct banks and the as-found locations of conflicting utility lines on the record drawings specified in Closeout Submittal requirements, and submit the record drawings.
 2. Install the electrical Work of this Section in conformance to the wiring methods general requirements of Article 300 in NFPA 70 (NEC), and to all other applicable Articles of NFPA 70 governing wiring methods.
 3. Cut conduit and wireway square, and ream the cut ends according to the requirements of NFPA 70 (NEC) to deburr the openings so that they are not restricted more than cuts made by the material manufacturer.
 4. Avoid bending conduits as much as possible and practical; but if bends are made, use an approved conduit bending tool or machine to make the bends.
 5. Do not install crushed or deformed conduit, and remove crushed or deformed conduit from the Site.
 6. On conduit that is installed outside, provide a second equipment ground conductor and use fittings with a built-in ground lug for bonding.
 7. Provide flexible conduit only to the extent permitted by NFPA 70 (NEC).
 - a. In flexible conduits that do not have an integral ground wire, install a green insulated wire in addition to the neutral wire for grounding purposes.
 - 1) Form a 'J' or 'S' hook with a drip loop to allow flexibility.
 - 2) Provide a second equipment grounding conductor on outside conduit and provide fittings with built-in ground lug for bonding.

SECTION 16131 CONDUIT AND FITTINGS

- b. Use PVC coated flexible metal conduit or liquid tight flexible metal conduit for final connection to rotating and vibrating equipment.
 - 1) Liquid tight flexible metal conduit, as herein specified, for final connection to all rotating and vibrating equipment including motors and pipe-mounted devices.
 - 2) Flexible conduit not to exceed 18 inches in length for motor connections, 36 inches in length for equipment connections.
- 8. Provide fittings and apparatus as required to construct the approved electrical design.
 - a. Running threads on conduit are not permitted.
 - 1) Where couplings and connectors are required for metal conduits, use approved threaded couplings and connectors.
 - b. Provide conduit unions where necessary to complete a conduit run when neither conduit end can be turned.
 - c. Where conduit and raceway runs cross building expansion joints, make provision for expansion in the conduit and raceway runs.
 - d. Provide sealing fittings with drain fittings in all lower runs and vertical runs.
 - e. Provide sealing covers for junction boxes where required.
 - f. Provide weatherproof conduit hubs on all conduit connections exterior to the building, and on instruments, process equipment, and pump motors.
- 9. Installing RGS Conduit:
 - a. Install RGS conduit using methods and techniques recommended by the conduit manufacturer.
 - b. Threading Conduit:
 - 1) Field thread the conduits per the manufacturer's instructions.
 - a) Do not damage or remove the coating beyond the proposed end of the threads.
 - 2) Once the threading operation is complete, protect the newly cut threads against corrosion by applying a "sealing" compound as recommended by the manufacturer.
 - c. Assembling RGS Conduit Fittings:
 - 1) Just prior to assembling each conduit joint, apply the conduit manufacturer's touch-up compound to the end of the conduit in the area normally covered by the fitting sleeve.
 - 2) Use cloth or other material over strap type wrenches to protect the coating while tightening conduits.
- 10. Breathers and drains shall be provided at the low point(s) of all conduit runs in NEMA 3R, 4, 4X and 7 areas, and where otherwise subject to the accumulation of condensation. Conduits shall be arranged to drain away from dry areas toward damp or wet areas, and away from equipment and enclosures.

C. Exposed Work:

- 1. In exposed work, run conduit and raceway parallel to centerlines and structure surfaces; or perpendicular to centerlines where required, with right angle turns consisting of symmetrical bends or fittings.

SECTION 16131 CONDUIT AND FITTINGS

2. Maintain at least 6 inches clearance between conduit and raceway runs and pipes, ducts, and flues of mechanical systems.
3. If a portion of a metallic conduit run, whether plastic-coated or not, extends above grade or is otherwise exposed to personnel, ensure that the conduit is properly bonded to an equipment grounding conductor at both ends.
 - a. Install the equipment grounding conductor either inside or outside the box.

D. Hangers and Supports:

1. Install auxiliary support structures, anchors, and fasteners as specified in Section 16070, Hangers and Supports.
 - a. Mount or suspend conduit and wireway systems directly on structural members of the structures and walls.
 - b. Do not attach conduit or raceway systems to suspended ceiling members or to the suspending mediums.
 - c. Securely attach anchors into walls.
2. At all conduit attachments, allow space between the mounting surfaces and the conduit by providing U-channel supports, clamp-backs, or spacers.
 - a. Attach wall-mounted conduit runs close to the walls following the contour of the walls, parallel to the walls and other building lines except at bends.

E. Structure Penetrations:

1. Make penetrations in existing concrete structures by core-drilling.
 - a. Drill the penetrations true, clean, and free from spalling.
2. Make floor penetrations as detailed on the Contract Drawings.
 - a. Seal all conduit penetrations through floor slabs on grade in buildings with a floor penetration seal.
3. Install a wall penetration seal at all wall penetrations.
 - a. Size wall penetrations to accommodate the conduit outside diameter plus either 1/4 inch or a whole allowance to allow the installation of the wall penetration seal.

F. Wiring:

1. Install wiring in conduit as indicated.
2. Prior to the installation of any wire, verify that the conduit is clean and free of debris.
3. Install a separate ground conductor for 1-1/2-inch through 4-inch PVC coated flexible metal conduit.

3.04 FIELD QUALITY CONTROL

A. Inspection:

1. Inspect installed conduit runs for obstructions, proper support, proper grounding, and completeness.
2. Record the actual installed elevations and locations of conduit and tubing on record drawings specified in Closeout Submittal requirements.

SECTION 16131
CONDUIT AND FITTINGS

END OF SECTION

SECTION 16138 BOXES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Requirements for furnishing, installing, connecting, cleaning, and protecting electrical pull and junction boxes.
- B. Related Section:
 - 1. Section 16050 - Basic Electrical Materials and Methods.
 - 2. Section 16060 - Grounding and Bonding.
 - 3. Section 16070 - Hangers and Supports.
 - 4. Section 16080 - Electrical Testing.
 - 5. Section 16122 - Low-Voltage Wire, Cable, And Accessories.
 - 6. Section 16131 - Conduit and Fittings.

1.02 REFERENCES

- A. National Electric Manufacturer's Association (NEMA):
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable.
 - 3. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code (NEC).
- C. American National Standards Institute (ANSI):
 - 1. ANSI Z55.1 - Gray Finishes for Industrial Apparatus & Equipment (*withdrawn 1990, no replacement*).
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 886 - Standard for Outlet Boxes and Fittings for Use In hazardous (Classified) Locations.

1.03 DESIGN REQUIREMENTS

- A. Product Data:
 - 1. Submit a list of the materials proposed to satisfy the requirements of this Section.
 - 2. Submit the manufacturer's comprehensive calculations used to determine size requirements for the boxes.
 - 3. Submit Product Data and catalog cuts of the materials and equipment proposed to be used to satisfy the requirements of this Section.

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BOXES

4. Include Product Data for the equipment and material provided under this Section with the Operation and Maintenance Manuals submitted in accordance with the requirements of the Specifications and Project Closeout.

1.04 SUBMITTALS

- A. Submit the following information to the Engineer for approval in accordance with the requirements of Contract Submittal Procedures:
 1. Product Data:
 - a. List of the proposed materials.
 - b. Catalog cuts of cast outlet boxes for general purpose applications used with steel conduit systems.
 - c. Catalog cuts of equipment and control device enclosures.
 2. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) Manufacturer's comprehensive calculations.
 - b. Test Reports.
 - 1) Factory test reports.
 - c. Certificates.
 - 1) Testing agency/quality verification, listing, and labeling.
 - d. Qualification Statements.
 - 1) Qualifications of the licensed electricians.
 - 2) Qualifications of the Electrical Testing Laboratory (ECL).

1.05 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. To supervise installation of the Work of this Section, employ licensed electricians.
 - 1) Submit the qualifications of the licensed electricians supervising the Work of this Section.
 2. Electrical Testing Laboratory (ECL) Qualifications:
 - a. Employ an independent testing agency, qualified as specified in Contract Quality Requirements, and Section 16080, Electrical Testing, to perform testing required by this Section.
 - b. Submit information verifying the ECL's qualifications.
- B. Regulatory Requirements:
 1. Perform the Work of this Section in accordance with the requirements specified in Articles 250, 300, and 370 of NFPA 70 (NEC), and to all other applicable state, local, and national governing codes and regulatory requirements.
- C. Certifications:
 1. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical

SECTION 16138 BOXES

Testing Laboratory (ETL) for the location installed in, and listed and labeled or approved for the application intended as indicated or specified, unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.

- a. Provide products that are approved, listed, and labeled for the short circuit currents, voltages, and currents indicated or specified to be applied.
- b. Provide service entrance labeled products for all service entrance equipment.
2. Submit evidence of testing agency/quality verification, listing, and labeling for each product with the submitted product data, either by providing a printed mark on the data or by attaching a separate listing card.
 - a. For items without such evidence, submit a written statement from the product manufacturer that indicates why it does not have quality assurance verification.

1.06 MATERIAL DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 1. Pack, ship, handle, and unload products in accordance with the requirements of Section 16050, Basic Electrical Materials and Methods.
- B. Acceptance at Site:
 1. Accept products at the Site in accordance with the requirements of Section 16050, Basic Electrical Materials and Methods.
- C. Storage and Protection:
 1. Store products in accordance with the requirements of Section 16050, Basic Electrical Materials and Methods.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Use of Trade Names:
 1. The use of trade names within the Contract Documents is intended to establish the basis of design and to illustrate the constructability and level of quality required.
 2. The use of trade names is not intended to exclude other manufacturers whose products are equivalent to those named, subject to compliance with Contract requirements.

2.02 MANUFACTURED UNITS

- A. Cast Outlet Boxes for General Purpose Applications:
 1. For Use with Steel Conduit Systems:
 - a. For use with steel conduit systems, provide small cast steel or cast malleable iron outlet boxes with threaded hubs that meet the NEMA 250 requirements for Type 12 enclosures.

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- b. If covers are indicated or specified, provide cast steel or cast malleable iron covers with neoprene gaskets.
 - 1) Provide captive Type 316 stainless steel mounting screws for the covers.
 - c. Finish:
 - 1) Provide boxes and covers followed first by a dichromatic prime, and then by an aluminum polymer finish coating conforming to NEMA FB 1.
 - d. Manufacturers:
 - 1) EGS/Appleton Electric, www.appletonelec.com.
 - 2) EGS/O-Z/Gedney, www.o-zgedney.com.
 - 3) Crouse Hinds
 - 4) Killark
 - 5) Or Approved equal.
- B. Equipment and Control Device Enclosures:
- 1. For all areas except outdoor and corrosive locations, provide enclosures with hinged doors that meet the NEMA 250 requirements for Type 4 or 12 enclosures, depending on Contract requirements.
 - a. Enclosure Cabinet:
 - 1) Provide sheet steel boxes having continuously welded seams, ground smooth.
 - 2) Provide enclosures having no holes or knockouts.
 - b. Enclosure Door:
 - 1) Provide overlapping sheet steel hinged doors, having a continuous hinge with a removable heavy gauge hinge pin and door clamps with screws to provide a watertight seal or to exclude liquids and contaminants.
 - 2) Provide a means of bonding on the door.
 - c. Door Gasket:
 - 1) Provide an oil resistant door gasket for each box.
 - d. Security:
 - 1) Provide a mechanism for padlocking the enclosure.
 - e. Finish:
 - 1) Provide polyester powder coating applied over phosphatized surfaces.
 - 2) Color: ANSI Z55.1 Number 61 gray.
 - f. Manufacturers:
 - 1) Hoffman, Single-Door Type 4 Enclosures or Type 12 and Type 13 Enclosures, www.hoffmanonline.com.
 - 2) Rittal Corp
 - 3) Milbank Manufacturing
 - 4) Or Approved Equal
- C. Ground Lug/Bus Bar:
- 1. Provide a copper ground lug or a 1/4-inch by 2-inch copper bus bar in large pull and junction boxes.

SECTION 16138 BOXES

2.03 SOURCE QUALITY CONTROL

A. Tests:

1. Submit factory test reports to the Engineer as specified for the products in this Section.

PART 3 EXECUTION

3.01 INSTALLERS

- #### **A.**
- Install the work of this Section only under the supervision of licensed electricians.

3.02 EXAMINATION

- #### **A.**
- Verify that conduit stub-ups to be mated with electrical boxes and enclosures are the correct type and size, and are at the proper location.

3.03 INSTALLATION

A. Junction Boxes and Pull Boxes for General Purpose Applications:

1. For general purpose applications in dry locations, provide small sheet steel pull and terminal boxes that meet the NEMA 250 requirements for Type 12.
2. Provide boxes that are fabricated from the same type of material as the conduit with which the boxes are used.

B. Equipment and Control Device Enclosures:

1. Provide enclosures that meet the NEMA 250 requirements for Type 4 or 12 enclosures, depending on Contract requirements.
2. For outdoor locations, provide enclosures with covers that meet the NEMA 250 requirements for Type 3R enclosures.
3. For corrosive locations, provide enclosures that meet the NEMA 250 requirements for Type 4X enclosures.

C. Installing Boxes for Other than Electrical Outlets and Devices:

1. Accurately punch holes for conduit openings using a hydraulic punch and punches sized for the conduit to be installed.
2. Install a conduit breather in the top of the box and a conduit drain fitting in the bottom of all boxes not located in bone-dry areas that are at least 100 feet from a hose-bib.
3. Support boxes for other than electrical outlets and devices using one of the following methods:
 - a. Mount the boxes directly to the structure using 4 or more anchors.
 - 1) Attach mounting screws to feet located outside of the box interior or seal the screw holes to prevent water penetration.
 - 2) Provide 1/4-inch spacers behind the boxes unless the box has raised pads.

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- b. Attach the box to two 1-inch or larger conduits which are supported within 12-inches of the box.
 - c. Attach the box to two 1-inch or larger conduits which exit from a poured concrete floor no further than 18-inches from the box.
 - d. Mount the box on U-channel and structural supports conforming to Section 16070, Hangers and Supports.
- D. Make up all conduit connections to boxes in accordance with the requirements of Section 16131, Conduit and Tubing.
- E. Install wiring in boxes in accordance with the requirements of Section 16122, Low-Voltage Wire, Cable, and Accessories.
- F. Ground boxes in conformance with Section 16060, Grounding and Bonding.

3.04 REPAIR/RESTORATION

- A. Touch up damaged coatings on electrical boxes and enclosures.

3.05 FIELD QUALITY CONTROL

- A. Site Tests:
- 1. Test all boxes to verify that they are properly connected to the grounding system.
- B. Inspection:
- 1. Inspect flush boxes to verify that the opening between the box and the wall finish is less than 1/16-inch.
 - 2. Inspect flush boxes to verify that each box is flush with the wall, or protrudes less than 1/16-inch, and is not set behind the wall surface.
 - 3. Inspect surface mounted boxes to verify that they are level and plumb within 1/16-inch as specified.
 - 4. Record the actual installed elevations and locations of pull and junction boxes on record drawings specified in Closeout Submittal requirements.

3.06 PROTECTION

- A. Protect boxes against damage from other work.

END OF SECTION

SECTION 16150 EQUIPMENT AND WIRING RESPONSIBILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: The work specified in this Section consists of services and work requirements for equipment and wiring responsibilities.

1.02 ELECTRICAL INTERFACE

- A. This Section of the Specifications is provided for clarification of the responsibilities of this Contract with regard to the connection of equipment provided under other Divisions of this Contract.
- B. Power and field required control interconnection wiring and conduits, including final connections of such to the electrical components of the equipment and controls, as specified within this Division of the Contract or indicated on the Drawings, shall be performed as work of Division 16 - Electrical.
- C. Equipment control panels and/or enclosures furnished and installed under other Contracts for this project, including integral unit mounted control panels, shall be provided complete with all internal wiring required by the supplier(s). This Section of the Contract shall be responsible for connecting the indicated field wiring to these assemblies unless specifically noted otherwise.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Basic electrical materials required for the work to be included in this Section are as specified in other Sections of these Specifications and as shown on the Drawings.

2.02 COORDINATION

- A. Electrical Equipment: Unless otherwise indicated, this Contractor shall provide the required safety disconnect devices, power contactors, VFD control panel, starters, and all other electrical appurtenances as indicated on the Drawings, for the connection and operation of all electrical equipment included in this project.

PART 3 - EXECUTION

3.01 INSTALLATION

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- A. Electrical materials being installed for the connection of equipment shall be installed as specified in the applicable sections of these Specifications, and as indicated on the Drawings.

3.02 EQUIPMENT WIRING

- A. General: Refer to the Drawing for the electrical field wiring required for this contract.
- B. Process and Mechanical Equipment Installation:
 - 1. Provide required power and control interconnection wiring to items of equipment indicated.
 - 2. Coordinate the installation of all field wiring with the respective Contract furnishing the equipment and with the approved shop drawings for the item being connected.
 - 3. Provide interconnection wiring between the existing pump control panel, control devices, VFD control panel, and branch circuit panelboards as indicated and required for an operational system.
 - 4. Approved shop drawings indicating the required wiring connections will be provided by the respective Contract responsible for furnishing the equipment.

END OF SECTION

SECTION 16420
MOTOR CONTROLLERS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the furnishing, installation, connection, and testing of motor controllers and manual motor controllers, indicated as motor controllers in this section.
- B. Motor controllers, whether furnished with the equipment specified in other sections or otherwise, shall meet this specification and all related specifications.

1.02 RELATED WORK

- A. Section 16050, Basic Electrical Materials and Methods apply to all sections of Division 16.
- B. Section 16122, Low-Voltage Wire, Cable, and Accessories: Low-voltage conductors.
- C. Section 16060, Grounding and Bonding: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 16131, Conduit and Fittings: Conduits.

1.03 QUALITY ASSURANCE

- A. Refer to Paragraph, Quality Assurance, in Section 16050, Basic Electrical Materials and Methods.

1.04 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 16050, Basic Electrical Materials and Methods
 - 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Include electrical ratings, dimensions, weights, mounting details, materials, overcurrent protection devices, overload relays, sizes of enclosures, wiring diagrams, starting characteristics, interlocking, and accessories.
 - 2. Manuals:
 - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
 - i. Wiring diagrams shall have their terminals identified to facilitate installation, maintenance, and operation.

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MOTOR CONTROLLERS

- ii. Wiring diagrams shall indicate internal wiring for each item of equipment and interconnections between the items of equipment.
 - iii. Elementary schematic diagrams shall be provided for clarity of operation.
 - iv. Include the catalog numbers for the correct sizes of overload relays for the motor controllers.
- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
- 3. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the motor controllers conform to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that the motor controllers have been properly installed, adjusted, and tested.

1.05 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. Institute of Electrical and Electronic Engineers (IEEE):
 - 519-92Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
 - C37.90.1-02Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
- C. International Code Council (ICC):
 - IBC-12International Building Code
- D. National Electrical Manufacturers Association (NEMA):
 - ICS 1-08Industrial Control and Systems: General Requirements
 - ICS 1.1-09Safety Guidelines for the Application, Installation and Maintenance of Solid State Control
 - ICS 2-05Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 Volts
 - ICS 4-05Industrial Control and Systems: Terminal Blocks
 - ICS 6-06Industrial Control and Systems: Enclosures

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MOTOR CONTROLLERS

- MG 1 Part 31.....Inverter Fed Polyphase Motor Standards
- E. National Fire Protection Association (NFPA):
 - 70-11National Electrical Code (NEC)
- F. Underwriters Laboratories Inc. (UL):
 - 508A-07Industrial Control Panels
 - 508C-07Power Conversion Equipment
 - UL 1449-06.....Surge Protective Devices

PART 2 - PRODUCTS

2.01 MOTOR CONTROLLERS

- A. Motor controllers shall comply with IEEE, NEMA, NFPA, UL, and as shown on the drawings.
- B. Motor controllers shall be separately enclosed.
- C. Motor controllers shall be combination type, with reduced voltage autotransformer motor controller per Paragraph 2.3 below with fused switch disconnecting means, with external operating handle with lock-open padlocking positions and ON-OFF position indicator.
 - 1. Fused Switches:
 - a. Quick-make, quick-break type.
 - b. Minimum duty rating shall be NEMA classification Heavy Duty (HD) for 480 Volts.
 - c. Horsepower rated, and shall have the following features:
 - i. Copper blades, visible in the OFF position.
 - ii. An arc chute for each pole.
 - iii. Fuse holders for the sizes and types of fuses specified or as shown on the drawings.
- D. Enclosures:
 - 1. Enclosures shall be NEMA-type rated 12 as indicated on the drawings or as required per the installed environment.
 - 2. Enclosure doors shall be interlocked to prevent opening unless the disconnecting means is open. A "defeater" mechanism shall allow for inspection by qualified personnel with the disconnect means closed. Provide padlocking provisions.
 - 3. All metal surfaces shall be thoroughly cleaned, phosphatized, and factory primed prior to applying light gray baked enamel finish.
- E. Motor control circuits:

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1. Shall operate at not more than 120 Volts.
 2. Shall be grounded, except where the equipment manufacturer recommends that the control circuits be isolated.
 3. For each motor operating over 120 Volts, incorporate a separate, heavy duty, control transformer within each motor controller enclosure.
 4. Incorporate primary and secondary overcurrent protection for the control power transformers.
- F. Overload relays:
1. Thermal type. Devices shall be NEMA type.
 2. One for each pole.
 3. External overload relay reset pushbutton on the door of each motor controller enclosure.
 4. Overload relays shall be matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 5. Thermal overload relays shall be tamperproof, not affected by vibration, manual reset, sensitive to single-phasing, and shall have selectable trip classes of 10, 20 and 30.
- G. Hand-Off-Automatic (H-O-A) switch is required unless specifically stated on the drawings as not required for a particular controller. H-O-A switch shall be operable without opening enclosure door. H-O-A switch is not required for manual motor controllers.
- H. Incorporate into each control circuit a 120 Volt, electronic time-delay relay (ON delay), minimum adjustable range from 0.3 to 10 minutes, with transient protection. Time-delay relay is not required where H-O-A switch is not required.
- I. Unless noted otherwise, equip each motor controller with not less than two normally open (N.O.) and two normally closed (N.C.) auxiliary contacts.
- J. Provide green (RUN) and red (STOP) pilot lights.
- K. Motor controllers incorporated within equipment assemblies shall also be designed for the specific requirements of the assemblies.
- L. Additional requirements for specific motor controllers, as indicated in other specification sections, shall also apply.
- 2.02 **MANUAL MOTOR CONTROLLERS**
- A. Shall be in accordance with applicable requirements of 2.1 above.

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- B. Fractional horsepower manual motor controllers shall have the following features:
 - 1. Controllers shall be general-purpose Class A, manually operated type with full voltage controller for fractional horsepower induction motors.
 - 2. Units shall include thermal overload relays, red pilot light, and toggle operator.
- 2.03 REDUCED VOLTAGE AUTOTRANSFORMER MOTOR CONTROLLERS
 - A. Shall be in accordance with applicable portions of 2.1 above.
 - B. Shall have closed circuit transition.
 - C. Shall limit inrush currents to not more than 50 percent of the locked rotor current.
 - D. Provide phase loss protection for each motor controller, with contacts to de-energize the motor controller upon loss of any phase.
 - E. Provide separate termination points in starter enclosure for connection to remote mounted HOA switch, elapsed time meter, pilot lights and overload reset switch.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install motor controllers in accordance with the NEC, as shown on the drawings, and as recommended by the manufacturer.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and electronic overload relay pickup and trip ranges.
- C. Set the taps on reduced-voltage autotransformer controllers at 50 percent of line voltage.

3.02 ACCEPTANCE CHECKS AND TESTS

- A. Perform manufacturer's required field tests in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify appropriate anchorage, required area clearances, and correct alignment.
 - d. Verify that circuit breaker, motor circuit protector, and fuse sizes and types correspond to approved shop drawings.
 - e. Verify overload relay ratings are correct.
 - f. Vacuum-clean enclosure interior. Clean enclosure exterior.

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- g. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data.
- h. Test all control and safety features of the motor controllers.

3.03 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall show by demonstration in service that the motor controllers are in good operating condition and properly performing the intended functions.

3.04 SPARE PARTS

- A. Two weeks prior to the final inspection, provide one complete set of spare fuses for each motor controller.

3.05 INSTRUCTION

- A. Furnish the services of a factory-trained technician for two 4-hour training periods for instructing personnel in the maintenance and operation of the motor controllers, on the dates requested by the Owner.

---END---

SECTION 16440 DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 SUMMARY

- A. Scope: Extent of disconnect switch work is indicated on the drawings and schedules, by the requirements of this Section, and Section 16050, "Electrical Basic Requirements".
- B. Types: Types of disconnect switches covered by this Section include the following:
 - 1. Enclosed, heavy duty non-fused switches.
 - 2. Enclosed, heavy duty fusible switches.

1.02 QUALITY ASSURANCE

- A. National Electrical Manufacturers Association (NEMA): Provide switches conforming to NEMA KS 1, "Enclosed Switches".
- B. NEMA: Construct enclosures conforming to NEMA 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)".
- C. National Fire Protection Association (NFPA): Conform to NFPA 70, "National Electrical Code", for installation and minimum fusing requirements.
- D. Underwriters Laboratories, Inc. (UL): Manufacture switches conforming to the requirements of UL 98, "Enclosed and Dead-Front Switches".
 - 1. Provide switches listed and labeled by UL.
 - 2. Provide fuse holders conforming to UL 512, "Fuseholders".
 - 3. Provide cabinets conforming to UL 50, "Cabinets and Boxes".

1.03 SUBMITTALS

- A. Product Data: For each switch provided on this project, furnish the manufacturer's published technical data, drawings, dimensions, and capacities.
- B. Submit shop drawings 30-days after date of notice to proceed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Square D, General Electric, Cutler Hammer, or approved equal.

SECTION 16440 DISCONNECT SWITCHES

2.02 SWITCHES

- A. General: Provide individually enclosed air-break switches as indicated and scheduled on the drawings, with all current-carrying parts enclosed and manually operable by means of external handles. Switches shall be heavy duty (HD) type, ampere and horsepower rated.
 - 1. Provide cartridge enclosed fuses and rejection fuse holders when fused switches are indicated.
 - 2. Provide NEMA 12 enclosure for indoors, NEMA 3R enclosure for outdoors, or as indicated on the drawings.
- B. Ratings: Conform to NEMA KS 1 for voltage and horsepower ratings.
 - 1. Voltages shall be 240 or 600 determined by the circuit voltage.
- C. Switching Action: Provide quick-make, quick-break type switch action.
- D. Construction: All current carrying parts shall be high conductivity copper, with heating ratings conforming to UL 98.
 - 1. Provide silver tungsten or silver-plated copper contacts.
 - 2. Provide fuse holders of the rejection type, sized for fuses scheduled.
 - 3. Switches shall have defeatable door interlocks that prevent the door from opening when the operating handle is in the "on" position.
 - 4. Switches shall have handles whose positions are easily recognizable and are padlockable in the "on" or "off" position.

2.03 FUSES

- A. General: Provide fuses that conform to UL 198C, 198D, and 198E. Provide fuses of the sizes noted on the drawings.
 - 1. Current-limiting fuses shall be installed in lieu of regular fuses where the fault current exceeds 10,000 RMS amperes.
 - 2. Provide one complete set of fuses installed for all switches requiring fuses. Provide ten percent spare fuses or three (whichever is greater) of each size and type installed. The spare fuses shall be delivered in the original boxes.

PART 3 - EXECUTION

3.01 INSTALLATION OF SWITCHES

SECTION 16440
DISCONNECT SWITCHES

- A. General: Provide NEMA 12 disconnect switches for interior use and NEMA 3R for exterior use.
- B. Installation: Install switches in conformance with the manufacturer's requirements and NFPA 70. Provide grounding in accordance with NFPA 70.

END OF SECTION